AN INTRODUCTION TO CHILD-STUDY

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PREFACE

This book aims at supplying a fairly comprehensive introduction to child-study. But child-study covers a wide field, and the author disclaims all ambition to be encyclopædic. An 'introduction' is obviously intended to lead to something further, and if the reader is induced to study children for himself, and to consult when necessary the more technical books and papers, these pages will not have been written in vain.

The author's manifold indebtedness to other writers will be obvious enough to readers familiar with current paidological literature. The author trusts that this debt is sufficiently acknowledged in the text. He desires to take this opportunity of thanking many friends for suggestions and assistance.

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CHAPTER I

INTRODUCTORY

'Child-study marks the introduction of evolutionary thought into the field of the human soul.'—STANLEY HALL.

BY child-study is meant the study of children by the methods of modern science. This definition, simple as it is, answers the question so frequently asked, What is child-study? Children, it is said, have always been studied. Why invent a new name for the process?

The answer is that a new method requires a new name. The stars were studied for thousands of years before there was a science of astronomy. The earth was studied for ages before there was a science of geology. Meteorology is new among the sciences, but when have men not studied the weather? Children have doubtless been studied ever since there first was a child upon earth, but it is only in our own day that they have become the object of scientific research.

Is there, then, some one may ask, a science of child-study? Is child-study a science? The answer to this question is that, as science is simply organized knowledge, all that we really know about children is necessarily scientific knowledge, or, at least, may be claimed by science as part of its raw material. But the study of children does not belong to any one department of science; still less can it be said to constitute 'a science' by itself. On the contrary, in studying children we constantly find it necessary to refer to some of the commonly recognized sciences, and especially to those which are grouped together as the biological. Thus the structure of the child's body belongs to the science of anatomy, its functions to the science of physiology, the relationship between human and animal structure and function to morphology. The study of human development, whether of the body as a whole or of individual organs, pertains to embryology. The study of the child's mind is a department of psychology. Teachers, and doctors, and sanitarians are all interested in the study of children from their particular points of view.

Perhaps by this time the reader may ask, Who is sufficient for these things? Is it really necessary to study all these sciences before one can study a little child? This has not been asserted. But I certainly think that one can scarcely study children scientifically, or appreciate the child-study point of view, without some slight training in scientific methods, some measure of the scientific spirit, and some slight knowledge of modern biology.

The kind of preliminary training which is likely to be useful to the would-be student of children I shall refer to more at length later. But before doing so let me say that I do not forget that there are plenty of people who know a great deal about children and nothing about science; who look at children from the sympathetic human point of view—in which they do well—but who, perhaps, are sometimes inclined to belittle the scientific point of view—in which they do not well. Such people as these will often be found to have not only sympathy and experience, but a great fund of common sense. And when people have sympathy, and experience, and common sense they have three of the essential requisites for the successful care of children. Such people, when they really do know about children, will be found to have been close, though possibly unconscious observers. But they have never set themselves to observe, still less have they attempted to formulate their knowledge. The result is that, however successful they themselves may be in managing children and in facing the problems that meet them from day to day, they cannot transfer their experience to others.

Now, the chief end of child-study, I take it, is to collect facts about children, and to formulate them in such a way as to make them available for science and for the use of those who need them for application to practical problems.

Moreover, scientific investigation may discover and settle very important questions where unscientific common sense failed to perceive that there was a problem at all. Let me give a single example. For thousands of years schoolmasters have been aware that in every class there are children who are lazy, inattentive, and stupid, and for thousands of years schoolmasters have been content to attempt to remedy these faults by the free application of the cane, though there must have been humane masters who perceived that the ends attained were altogether insufficient to justify the means employed. But the moment science came upon the scene it was seen that, if stupidity is to be cured, it must be by discovering its cause and removing it. Accordingly, stupid children were investigated, and it was quickly discovered that a considerable proportion of them were suffering from nasal obstruction due to the presence of adenoids. Could this condition have anything to do with the stupidity and inattention ? Experiment settled the question. Removal of the adenoids by a slight surgical operation was followed immediately by a remarkable change in the child. Many children after this procedure became bright and intelligent, and made as much progress in their school work in a few weeks as they previously made in a year or more.

Why do People study Children?

In attempting to define child-study, I have indicated that people may approach the subject for very various reasons. The exponents of the various sciences to which child-study is related turn to child-study not because they are interested in children, but because they hope to discover facts which will throw light on their particular sciences. The philologist, for instance, turns to baby linguistics in the expectation of gaining a better understanding of the origin of human speech. The anthropologist, unable to discover a living specimen of primitive man, turns to the child as his nearest representative. The archæologist finds valuable material in the child's attempts to draw.

The study of children, again, has a very important bearing upon many sociological and political questions. The appalling infantile mortality of our large towns, for example, obviously cries aloud for investigation and treatment. And in the train of this question comes a whole procession of others—intemperance, industrial conditions, more particularly as affecting married women, the survival of the unfit, and so on.

But probably most students of children are primarily interested in the bearing of child-study upon the direct welfare of the children themselves. One of the very first results of child-study is the demonstration of the fact that children are very far indeed from being merely diminutive men and women. Doctors are discovering that the treatment of children's ailments involves much more than the prescribing of smaller doses. Very many children's disorders do not occur in adults at all, and where similar diseases do occur, the course of the disease, the probable complications, and the most suitable treatment may be quite different in the case of the child. Yet so little is this recognized that a considerable proportion of medical students go through their whole course of studies, and become fully fledged medical men without ever having seen or examined a sick baby!

Teachers, again, are beginning to realize that the methods by which they get up a subject may be very unsuitable for teaching that subject to a child. Indeed, we are coming to recognize that the primary aim in education should be, not instruction in subjects, but development of mind. And if we are to aid the development of mind we must study children in order to discover the normal course of mental development and the nature of their mental processes.

Quite a number of people, also, are beginning to ask whether, instead of quarrelling among ourselves about denominational and undenominational teaching, it might not be as well, in the first place, to discover whether, and to what extent, young children are capable of assimilating dogmatic moral and religious instruction at all.

The Organization of Child-Study.

In recent years the investigation of children has been pursued with such energy and industry that child-study may now be regarded as a world-wide movement. The amount of literature upon the subject is enormous, and workers have found it necessary to band themselves into societies, and to start periodicals devoted solely to the interests of their cause.

The principal society in the United Kingdom is the British Child-Study Association, which was founded in 1894, and which now has branches in London, Edinburgh, Birmingham, Manchester, Liverpool, Cheltenham, Dundee, and Exeter. The organ of this association is *The Paidologist*, which is published three times yearly, and may be obtained from the publishers, Messrs. Norman, Sawyer and Co., Cheltenham.

The Childhood Society was founded in London almost simultaneously with the B.C.S.A., as the first-named association is designated by its friends. The *Transactions of the Childhood Society* include a number of valuable papers. Negotiations for the amalgamation of these two societies are now in progress.

The Parents' National Educational Union is a society which, if not in quite full sympathy with the child-study movement, has adopted principles which presuppose child-study. This society's chief aim is improvement in education, and by education is meant the development of the whole nature on the underlying principle that 'character is everything.' The society has numerous branches, and publishes a magazine, *The Parents' Review*, of which specimen copies may be obtained by writing to the Secretary, P.N.E.U. Office, 26, Victoria Street, London, S.W.

In America the study of children is carried on very actively. The recognized leader of the movement there is Principal Stanley Hall, who, since the publication of his pioneer paper on 'The Contents of Children's Minds' in 1882, has done more than any man living to promote the investigation of child-nature. In addition to issuing numerous syllabuses, which have been invaluable to other workers, Principal Hall has himself published a large number of papers, and in 1904 issued his *magnum opus*, two large volumes dealing with *Adolescence*, which constitute a mine in which future workers will dig for many a long day.

The spread of the movement in America is evidenced by the great extent of the periodical literature devoted to the subject. Many of the papers which are published are the outcome of work done in experimental laboratories established in connexion with various Universities. The *Pedagogical Seminary* is devoted solely to the interests of child-study, and the *American Journal of Psychology* frequently contains articles dealing with children. Mention should be made of the invaluable bibliography of current literature by Louis H. Wilson which appears periodically in the *Pedagogical Seminary*.

On the continent of Europe, also, child-study has numerous votaries, and in many University centres laboratory methods of investigation have been largely used for studying both the physical and the mental sides of child-life. France, Germany, Italy, Belgium, all have their child-study literature, and—to go beyond the bounds of Europe—Japan has its child-study magazine.

CHAPTER II

PREPARATION

'Thou that teachest another, teachest thou not thyself?'

Most of us who are interested in child-study are, I suppose, attracted thereto by an impulse which is personal at least as much as scientific. We are drawn to the subject by the feeling that it may help to bring us nearer to the life, and especially to the conscious life, of the children in whom, whether as parents, or teachers, or friends, we are interested.

The need of a better understanding of children has long been felt, and from time to time has found expression. Long before Herbert Spencer reproached the Englishman for studying his horses and neglecting his children, Roger Ascham, in his *Schole-Master*—a work of rare charm—made use of the same comparison. He complains that 'Horsemen be wiser in knowledge of a good Colte than Scholemasters in knowledge of a good witte,' and that even very wise men 'have more care to find a cunnynge man for their horse than a cunnynge man for their children'; wherefore, he says, 'God, that sitteth in heaven, laugheth their choice to skorne, and rewardeth their liberality as it should; for He suffereth them to have tame and well ordered horse, but wilde and unfortunate children; and therefore in the ende they find more pleasure in their horse than comforte in their children.'

These words were published in 1570, and it would be easy to quote many other writers from Ascham's time to our own to show that they also felt that personal impulse towards a more careful study of childhood which I have spoken of as animating ourselves. But the important point to notice is that the real reason why child-study is an essentially modern movement is that its pursuit requires something more than impulse of this kind.

If we are to study children to any purpose at all, we must be prepared to take a little trouble about it, and it will not be amiss to consider briefly the kind of preliminary training the student of childhood is likely to find useful. I sincerely trust that nothing I say will even seem to warn off intending inquirers. I am not one of those who think that child-study is for specialists only; but I do think that, although we cannot all be specialists, we may at least aim at putting ourselves in a position to understand the specialist's work, and strive among our friends and neighbours to arouse interest, to kindle desire for knowledge, and to help one another to a better understanding of the children, and of the methods of adapting to their needs the ideals we cherish for their training.

The first desideratum for the student is not so much some knowledge of this science or that as the possession of some measure of the scientific mood.

This mood is characterized, in the first place, by a great passion for facts. To make sure of our facts is the first essential in all scientific work, but few people know how difficult it is. 'The more I think of it,' says Mr. Ruskin, 'I find this conclusion more impressed upon me—that the greatest thing a human soul ever does in this world is to see something and tell what it saw in a plain way.' Perhaps nothing can more effectually bring home to us the care requisite for the exact observing of facts than some sort of training such as is afforded by a course of laboratory work; and hence to the future student of children some discipline of this kind, some faithful work of weighing, or measuring, or dissecting, or analysing, may be warmly recommended.

The scientific mood is not only an acquisitive mood; it is also a questioning mood. Even when we think we have got our facts, we must look at them with suspicion. We must test them in every possible way. We must be awake to the possible sources of error. We must be cautious as to the use we make of the facts. Fallacies of observation and fallacies of deduction are alike pitfalls into which it is only too easy to fall.

Professor Huxley used to be fond of saying that his favourite Apostle was St. Thomas, and certainly the virtue of honest doubt which the Professor admired in the Apostle is one which all students of science must cultivate. The natural man, honest fellow, is much too credulous, much too ready to believe any story which is set before him—as some of the newspapers well know. Consider, for instance, the following interesting tale which has recently been going the round of the papers:

There is, it appears, in Switzerland at the present time a man who has two hearts. The case has naturally excited the greatest interest in the medical profession, and numbers of doctors have carefully examined the patient. The Academy of Medicine of London has even given the man £2,000, in return for which it is to obtain the unique specimen for its museum after the present owner's death.

Now, it does not require much consideration to see that this story is, to put it mildly, a tissue of improbabilities from beginning to end. Not only is it unlikely that a child should be born with two hearts, but it is extremely improbable that such a creature, if born, could live to man's estate. If such a curiosity did exist, it is scarcely likely that such a bargain as is spoken of would be entered into, for the difficulties of ensuring that it would be carried out are obviously very great. Moreover, the Academy of Medicine of London is scarcely a likely body to enter upon such a speculation, seeing that it not only possesses no museum, but has not even any existence itself. But how many people who read the story would not regard the visits of the doctors, the Academy of Medicine, and the £2,000 as so much corroborative evidence of the truth of the story?

Although caution is a virtue and doubt a duty, it is, of course, possible to be too cautious. The student has to be particularly careful lest his own prejudices stand between him and truth. When we are looking for facts in support of some favourite theory, it is exceedingly difficult to see even the most obvious facts which tell the other way. It is scarcely too much to say that the whole history of science is a history of progress in the face of popular prejudice. As it has been expressed, every great advance in science has been met, first by denial—It is not true; then by clamour—It is contrary to authority; then by assertion—But we have known it all along. It is scarcely possible for most of us to realize the opposition which had to be faced by doctrines which at the present day are not only the commonplaces of scientific teaching, but form part of the familiar mental scenery of all educated people. Try, for example, to put yourself into the mental attitude of the poet who wrote, and of the people who applauded, the following lines:

'Some drill and bore
The solid earth, and from the strata there
Extract a register, by which we learn
That He who made it, and revealed its date
To Moses, was mistaken in its age.'

COWPER: *The Task.*

We can scarcely realize such an attitude towards the familiar teaching of geology; but then the fact that the age of the earth is to be measured, not by years, but by millenniums, is just one of the familiar things which we have always known, have we not? None the less, every one of us must be continually on our guard to set aside personal bias; and if we cannot do this, we need not think we can do any sort of scientific work at all.

A third feature of the scientific mood is that it is an imaginative mood. The scientific mood is not satisfied with the collection of facts. It strives to see them in their sequences and relationships. It tries to build up mental pictures of the outer world. It aims at the discovery of law. The scientific use of the imagination has been at the bottom of all great discoveries. The scientific imagination can see the stomata opening and closing in the leaves. It can see the sap rising in the stem. It can see the atoms taking hands and building up the molecules of matter. It can see the waves of ether travelling with incredible swiftness through space. Such pictures as these form the material out of which the imagination constructs those formulæ which we call the laws of Nature. And such laws formulated by the imagination are themselves a gift of the imagination. For science presents us not merely with dry facts, but with the transcendent spectacle of a fresh revelation of the world. The scientific imagination furnishes us with a verifiable body of truth, with something to believe in which is independent of opinion, and of prejudice, and of tradition.

Moreover, the scientific imagination enters into the domain of prophecy. The imagination of a Leverrier demands another planet in a particular part of the heavens, and there the planet Neptune is discovered. The imagination of a Mendeleef foretells the discovery of elements with certain atomic weights and with certain properties. His mental construction of the world needs them, and in due time science makes them known. An imagination which can justify itself in this way must evidently be a trained imagination. It must be an imagination which can take account of facts and probabilities, which can continually criticize and test the products of its own functioning.

Moreover, such an imagination suggests another characteristic of the scientific mood, and that is boldness. The scientific mood is cautious, but it is also bold. When we have made quite sure of our facts, and when we have thoroughly tested our theories, we must not draw back in fear when we find where they are likely to lead us. In science there is no 'Thus far, and no farther.' The men who first dared to maintain, on the testimony of the rocks, the immense age of this earth were bold men. Those who first taught the immense duration of life upon the earth were very bold. Bold also were those who first supported the doctrine that all the various species of living things originated not by creation, but by evolution. Such boldness has been abundantly justified in the magnificent development of modern science. And here let me remark that it is a curious thing that many people even yet eye the wonderful achievements of science with jealousy. They take delight in asking questions to which science has as yet no answer, and taunt it with its inability to answer them. Examples of this sort of thing are common enough. Here is one from Mr. Stopford Brooke:[1]

'When have the hereditarians explained Shakespeare, Mozart, Turner? When has the science of the world explained the birth of a lyric of Burns, a song of Beethoven's, or a drawing of Raffaelle? Let these gentlemen veil their eyes, and confess their inability to explain the

[1] *The Poetry of Robert Browning.*

facts. For it is fact they touch. "Full fathom five thy father lies"—that song of Shakespeare exists. The overture to Don Giovanni is a reality. We can see the Bacchus and Ariadne at the National Gallery and the Theseus at the Museum. These are facts, but they are a million, million miles beyond the reach of any science. Nay, the very smallest things of their kind, the slightest water-colour sketch of Turner, a half-finished clay sketch of Donatello, the little song done in the corner of a provincial paper by a working clerk in a true poetic hour, are not to be fathomed by the most far descending plummet of the scientific understanding.'

Surely this is a little ungracious. It is certainly altogether irrelevant. Surely the laws of heredity were not violated in Shakespeare's birth, nor the laws of cerebral physiology in the writing of *The Tempest.* To appreciate Shakespeare's plays or to enjoy Turner's pictures another mood than the scientific is necessary, and such moods we should try to cultivate. But explain *Hamlet!* No; science cannot do that. It is no part of the business of science to do so. It is very important that this should be understood quite clearly, so just let me quote what Professor Arthur Thomson,[1] who can speak with authority, has to say on this point.

'It should be carefully noted that those who have the scientific mood do not venture to think that they can give explanations of things, if by that is meant ultimate explanations. The word "ultimate" does not occur in the scientific dictionary. The biologist draws cheques, but they are all endorsed protoplasm; the physicist's bills are accepted, but only on the credit of the ubiquitous ether or the mighty atom; and these are conceptual hypotheses.

'Science describes, analyses, discloses chains of sequence,

[1] 'The Scientific Mood,' *Scot. Nat. Hist. Soc. Trans.*, 1901.

gives mediate explanations perhaps, but no ultimate explanations. The man of scientific mood sees certain fractions of reality which interest him; he seeks to see them as clearly as may be, to put them in an ordered rational series; to reduce them to similar terms, to find their common denominator. Apart from his science he may cherish the belief that some day the common denominator may turn out to be the same as the philosopher's greatest common measure. I mean, as Fouillée says, that science is a broken mirror whose reflections of reality philosophy has to reunite.'

THE CULTURE OF THE SCIENTIFIC MOOD.

The practical cultivation of the scientific mood may very profitably be pursued in fields which have some relation to child-study, and as our work deals with life, we may well take our preliminary canter in the field of biology. The careful study of such works as Darwin's *Origin of Species* or *The Descent of Man* will give one some insight into scientific method. But the value of such a study would be greatly enhanced by carefully working through some such manual as Huxley and Martin's *Practical Biology*. It matters little what branch of biology is chosen for study. Botany will appeal to some, zoology to others. The great thing is for the student to learn to see things for himself; to see things clearly and definitely; to learn to make sure what he really does see and what he does not see. The speculative side of biology is also very important, and a due appreciation of child-life necessitates a knowledge of what biologists are saying about such subjects as evolution, and heredity, and the influence of environment on life.

So many of the questions which meet us in studying children are primarily biological that I shall leave their further consideration for a future chapter, and proceed to say a few words about another mode of approach to child-study, namely, psychology. The importance of this subject is so obvious that I might be asked why I did not mention it before biology. The reason for this is that biology seems to me to pave the way for child psychology. When the student has studied the child as an animal, he is in a better position for studying and trying to understand how the characteristic human faculties are grafted upon or grow out of what I may, without disrespect, call the animal nature of the child.

Such studies have already helped us greatly in understanding the development of the senses, and the relationship between them and the development of the intellect. The first sensations felt by the child have no meaning for it. They simply produce a sense of comfort or discomfort, and it is only very gradually that they come to be interpreted as produced by outside objects.

The development of this power of interpreting the impressions of sense is naturally indicated by a gradual change in the movements of the child. The first movements of the child are aimless and random in character, or such as may be explained as resulting from reflex action. With the development of consciousness and intelligence the child acquires the expression and attitude of attention and interest, the movements of the voluntary muscles become gradually more complex in character, and by slow degrees the developing will gains control over the child's activities.

It is by the careful study of sensations on the one hand, and of the movements and activities of the child on the other, that we must seek a fuller understanding of the child's mental evolution. In some way or other, which we can only dimly picture to ourselves, these ingoing currents of sensation gradually lay the foundations of the child's mental world; and these outgoing currents, which bring about the movements of the child, reveal the ordering of the foundations of future activity and conduct. In this complex process various factors are engaged. To some extent, as we know, the child takes part in his own evolution. By his own activity, by his own exertion, by his own incessant restlessness, imitation, experimentation, he makes himself acquainted with the world about him. All the time the unseen forces of heredity are laying down the channels of sensation and association, awakening instinctive cravings and ordering the appropriate activities. It is difficult for us even to imagine, impossible for us, I think, clearly to realize, what the child's mental world is really like during the early periods of development. Certainly it is very patchy in character, and vague and indefinite in outline, and the connexion between the various kinds of sensuous knowledge is very slowly acquired. Interpretation proceeds bit by bit from the vague and indefinite to the clear and definite, as various frequently repeated sensations gradually begin to impress themselves upon his mind. Sometimes, also, flashes of insight apparently indicate the occurrence, with comparative suddenness, of some definite step for the time of whose coming the way has been prepared beforehand in the secret places of the mind.

We still need a master to deal adequately and satisfactorily with the development of the higher human faculties. Only after some degree of intellectual culture and emotional experience has been attained can we look for the manifestations of those higher attributes which are characteristic of man as man. Children are so ready to copy our æsthetic preferences, to parody our intellectual judgments, to conform to our moral standards, that we may easily give them credit for the possession of stand-

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points which are not really theirs, and, on the other hand, may miss the real beginnings of the higher life. Many studies have been made on the æsthetic sense, while the development of the reasoning powers, and the cultivation of moral appreciation, and of the religious mood, have ever been objects of watchful care among all who take thought for the higher nurture of their children, and we are not without some knowledge of the drama of the soul's development. Yet we cannot point here to any such increasing body of facts as is accumulating through the study of the child's bodily and mental development.

This is, of course, only what is to be expected, for if our study is concerned with beginnings, then must we begin with the simplest things, and make sure our knowledge of the foundations before seeking to understand the more complex phenomena which grow from them. We shall travel furthest if we hasten slowly. The simplest operations of the mind, also, are those which are common to all children. Their manifestations are studied at a time when the child has not to any appreciable extent become the victim of prejudices imposed from without, and they are themselves, like all other primitive things, comparatively little liable to variation from within.

The higher human attributes, on the other hand, having appeared late in the history of the race, are yet unstable, and vary greatly in different individuals in their time of functioning, in their mode of appearance, and in the form of their manifestation. Often the best growth of these faculties seems to take place almost unconsciously, and not until they are ripe does the child, in some flash of insight, realize some hitherto unnoticed relationships, and thus take a definite step in his development.

In studying young children, then, we pursue the same methods of observation and are guided by the same canons of interpretation as in the investigation of animal life, and a careful study of some of the best works on animal instincts and intelligence should therefore form part of the preparation of the student of mind in children.

As children grow older the difference between them and adults gradually becomes less marked, and our knowledge of general adult psychology becomes correspondingly more useful. Memory of our own early days also comes to our aid, and shows us that there is really no break between the mind of the child and the mind of the adult. Our own childish recollections help us to see in the queer things children say and do the germs of the adult mental life. Here the observer will gain much help by studying some good works upon the development of young children, such as those of Professor Preyer or Miss Shinn. These will show him what to look out for, what questions he should have in his mind, and how his observations may be interpreted.

While some preliminary study of biology and psychology will certainly be found of value as a preparation for the study of children, there is another mode of approach which will appeal to many people—namely, the study of educational methods. One may study children in order to discover methods of education adapted to their needs. But one may also reverse the process, and the study of a method of education adapted to the nature of the child will often open our eyes to characteristic childish features which we should otherwise have overlooked.

Many educational methods which may be studied in this way are to be found in the Bible. Let me instance a single one.

When Joshua led the children of Israel across the river Jordan, twelve stones were taken up out of the river. 'Those twelve stones, which they took out of Jordan, did

Joshua pitch in Gilgal. And he spake unto the children of Israel, saying, When your children shall ask their fathers in time to come, saying, What mean these stones? Then ye shall let your children know, saying, Israel came over this Jordan on dry land.'

Here we have, evidently, a method of education—a method of teaching history. What has it to teach us about child-nature?

Well, the first thing one notes is the implied recognition of the principle that in teaching any particular subject one should wait until the suitable time has arrived. In this case the lesson was not to be given until the children asked for it. The twelve stones set up in Gilgal secured the giving of the lesson at what, in modern slang, is called the psychological moment. Moreover, the lesson would come as an answer to childish questionings, and therefore when it came it would not be isolated from the children's experience. For we may be sure that for many a day the children played about these stones before they began to wonder where they came from and who had placed them where they stood. And when the story was told, and when they understood the meaning of these, their stones, it would weave itself into their being as part of their own history. Henceforth they would look at the stones with new eyes. Every time they looked upon them the story of the crossing of the Jordan would recur to their minds. Perhaps, in children's dramatic way, the story would be re-enacted; once more the Israelites would assemble on the river's bank; once more the waters would be commanded to divide; once more the hosts of Israel would cross the river as upon dry ground. And thus through the children's spontaneous activity Israel's story would become their own.

There will be found in the Bible many other examples of this kind—examples of methods of education adapted to the requirements of children or of childlike people—and the study of such examples will help one to understand the mind to which they were adapted.

The traditional ways of singing and talking to young children, the traditional games which mothers play with their children, and those which older children play among themselves, family and social observances, the keeping of birthdays and of anniversaries, may all be dignified as methods of education. Such methods were not, however, deliberately invented with the express purpose of application to developing mind. They must rather be regarded as unconscious adaptations of educational methods to educational requirements. Not till a much later date did the study of childhood become, as I may express it, self-conscious. It is in the kindergarten system of education that we find the best example of a method of education thought out in the light of a careful study of children, and purposely adapted to the nature of the growing child. Froebel has been with some truth described as the discoverer of childhood. Of set purpose he based his system of education upon the spontaneous activity of the child, because he saw what the activity, the restlessness, the playfulness of the child really meant.

I am quite sure that no one who desires to prepare for a study of childhood can afford to neglect a careful consideration of Froebel's educational ideals. Froebel's ideals are not always easy to understand, but the trouble which is required to grasp them will be well repaid. In studying any of the gifts, or occupations, or games, or songs, the question which we have to keep always in mind is not how the child can be brought to use these things, but what these things are intended to do for the child, and how they are intended to do it. Whoever takes the trouble to understand this will surely be rewarded by increased insight into the mind of the child.

CHAPTER III

CAUTION IN CHILD-STUDY

'Who is able to speak worthily of the fulness of childhood?'
GOETHE.

IT is only natural that child-study should have met with criticism. But the modern child-study movement has spread so rapidly; it has so obviously secured the support of men and women of experience, ability, and balanced judgment; its conclusions have been so accordant with reason and common sense; and the practical application of its teaching to the care and education of the young has been found so beneficial, that the keenest critic has quickly found himself constrained to roar 'as gently as a sucking dove.'

Criticism has come mainly from two quarters—from members of the public who think that the study of children is useless, if not actually harmful to the children studied; and from scientific people, who tell us that child-study can never be an exact science—that its workers are, many of them, untrained in scientific methods, and that accordingly its observations are likely to be inaccurate and its conclusions unsound.

As an example of the first class of criticism I may quote from Mrs. Richmond's little book, *The Mind of a Child*: 'I have said that this science of child-study may be fascinating and interesting to ourselves, but that I cannot see in what way it can be useful to children. The only thing that matters to them is that we should assist them to grow from happy children into happy men and women. As the only happy men and women are those who are at work on the improvement of the world around them, so the only thing that matters to us in our contemplation of children is that we should teach them while they are young and plastic such habits as will most conduce to virtue.'

The obvious answer to criticism of this sort is that child-study cannot fail to be advantageous to children if it helps us to understand them better, and that without the better understanding to which child-study points the way we shall often fail in our dealings with them.

As to the fear that child-study may injure the child, we shall have something to say by and by.

The second class of criticism may be represented by Professor Miall and Professor Munsterberg.

Professor Miall remarks that 'It is a tenable proposition that unscientific common sense—the home-baked philosophy of experience—may be really a better guide to the teacher than the textbooks of an immature science'; but he admits the value to the teacher of the work which has been done on such subjects as Habit, Attention, Association, and Memory.

Professor Munsterberg is a more severe critic. In some magazine articles he maintains that experimental psychology is of no use to the teacher, and he appears to fear that there is a grave danger of child-study leading the teacher into an altogether wrong attitude towards his pupils. He argues against the artificial separation of child from general psychology. Most of the so-called child psychology, he tells us, is partly history, partly economics and ethics, partly nothing at all, but decidedly *not* psychology. He criticizes various studies of a statistical character which have been published, and remarks that we could as well have a special botany of blossoms or a zoology of eggs as scientific ends in themselves as a separate psychology of children.

Now, I do not propose to attempt to answer this criticism at any length. One would suppose that if psychology is of any use to anyone, it must be to teachers. It is no doubt true that excellent methods of education have been discovered empirically, and many successful teachers have not been professed psychologists. But few of us would trust a doctor who boasted that he had no use for physiology, and declared that it was enough for him to know what drug was 'good for' a particular disease, without troubling about its special physiological effects; and we should be equally suspicious of a teacher who is unable to find use for psychology in solving the problems which meet him in the class-room.

As to the discovery that a good deal of child-study is not psychology at all, that is just what we are always insisting upon. As Colonel Parker expresses it, 'the whole child goes to school,' and, accordingly, our study aims at the whole child, body, mind, and spirit.

The statistical method of inquiry has called forth a good deal of criticism from others besides Professor Munsterberg, and it must be admitted that some of the studies which have been made by this method are of no particular value. But this was quite inevitable. It is only by experience that we can discover in what directions this method of investigation is of use and in what directions it is not. Where statistical inquiries have been carried out in the field of child-study by competent investigators, and with due care to secure accuracy, the results have every appearance of being as reliable as in other fields where statistics are of admitted value. Indeed, the regularity of the curves obtained is a graphic illustration of the fact that in studying developing mind we are studying a chapter in the 'Reign of Law.'

Such criticism, however, may serve to remind the student that the study of children is attended by certain difficulties, and that, accordingly, his work must be pursued with caution.

In studying children, caution is especially required in the following particulars:

1. *In Observation.*—I have already said that in all science one must make sure of one's facts, and that to do so is never easy. In the case of children it is particularly difficult. It is extremely difficult to observe children in any systematic way without interfering with the very phenomena which are being studied.

Miss Shinn, in her *Notes on the Development of a Child*, says that observing is not doing anything to a child. 'No one who has good judgment will allow himself to spoil both the child and his own observation, and anyone who has not good judgment will find plenty of ways to spoil a child more potent than observing him.' This, of course, is very true so far as it goes, but the great difficulty is that the phenomena we wish to observe are often so easily influenced that the mere fact of observation can hardly leave them altogether natural and spontaneous. Babies may undergo a great deal of examination and experimentation without realizing that they are being observed, but even in their case systematic observation of particular phenomena may entail results which would not have occurred otherwise. Frequent testing for colour preferences, for example, may hasten the development of the colour sense. Such a result, however, is scarcely a difficulty or a danger. It is in the case of older children—children who are engaged in studying us with at least as much interest and zeal as we are studying them—that we find the chief difficulty in avoiding fallacies of observation. In Professor Barnes' *Studies in Education* it is stated several times that, where statistics for some research had been collected from a number of schools, it was found necessary to set aside the papers supplied by a certain school or a certain teacher because the replies of the children contained evidence that they had been influenced from without. In collecting facts of any kind, therefore, concerning children, one must carry out one's observations with great circumspection, and subject one's results to most thorough scrutiny before finally accepting them.

2. *In Interpretation.*—In studying children, it is often very difficult to distinguish between what we observe and what we merely infer. Indeed, a large proportion of the observations which we make upon children in our everyday life are really inferences. Thus, when we say that we notice a child to be tired, or angry, or hungry, or cold, we are not describing what we see, but our interpretation of what we see. Of course, it is quite legitimate, in ordinary conversation, to speak in this way, but when we are trying to be scientific we cannot be too careful as to the accurate choosing of our expressions. It is in describing our observations on infants especially that we are apt to allow ourselves the use of words and phrases which imply more than we have any right to assert. I have, for example, seen it recorded that a certain baby, at the age of *four days*, was able to follow a slowly moving object with its eyes. Now, I have no doubt that the observation was quite accurate, but the means of expression is open to criticism. I believe that the baby's eyes were actually seen to follow a moving object, but I do not believe that the baby really possessed the capacity implied in the phrase 'was able.' Again, it is sometimes stated that at a certain period a

child begins to have an idea of causation because it turns its head in the direction of a sound. This is an example of an inference which goes a long way beyond the facts observed. Does a sunflower have an idea of causation when it turns towards the sun?

Writers on the instincts of animals for the most part acknowledge a canon of interpretation which it would be well for the student of young children to keep in mind. This is the so-called doctrine of economy. It is to the effect that if the actions of an animal can be explained in more than one way, we are bound to adopt the simpler explanation. For example, if a certain action may be either instinctive or intelligent, we must consider it instinctive unless the contrary can be proved on other grounds. If this canon were kept in mind, it would often keep us from straying in our descriptions of the doings of children beyond what we have in point of fact observed.

A critical study of works dealing with animal intelligence will furnish plenty of examples of the difficulty scientific men themselves have in keeping inferences separate from facts. Let me quote a single instance from Darwin, who was not always very careful in this respect. In his *Descent of Man* we find the following:

'All animals living in a body, which defend themselves or attack their enemies in concert, must indeed be in some degree faithful to one another; and those that follow a leader must be in some degree obedient. When the baboons in Abyssinia plunder a garden, they silently follow their leader; and if an imprudent young animal makes a noise, he receives a slap from the others to teach him silence and obedience.'

Assuming that the incident here recorded is correctly reported, it is evident that the description goes beyond a mere narration of the facts observed. It may be the case that a young baboon on such an expedition as is referred to may, on making an outcry, receive a slap from its seniors, and it may be that such chastisement does teach it greater prudence. But it is a pure assumption that the older animals have any such reasoned foresight of the result of the discipline inflicted as is assumed in the description. All that was actually observed was that a young baboon, on making a noise, was struck by one or more of the others. Probably enough the striking was simply the instinctive expression of anger aroused by the outcry. Of course, we cannot postulate even anger as the cause of the cuffing without passing from the domain of observation into that of inference. But if it is granted that the chastisement administered might be either the direct expression of anger or the indication of an intention to teach the culprit greater prudence, the principle of economy would lead us to choose the former explanation.

It may be said that the simpler explanation of an action may not always be the true one, and that the doctrine of economy might sometimes lead us astray. This, I think, is true. But the point is that we are safer in adopting the simpler explanation, unless we have very good reason for not doing so. For example, if the point at issue is whether or not animals are intelligent, no action which can by any possibility be explained otherwise can be brought forward as evidence of intellect. On the other hand, if an animal is admitted to be intelligent—let us say the young of the human species—we need not apply the principle of economy so strictly in deciding whether or not a particular action displays intelligence. Still, in cases of doubt we shall do well to apply the principle and adopt the simplest explanation which fits the case.

3. *In Generalization.*—I do not think that generalization from an insufficient number of data is a *special* danger of

child-study. Indeed, child-study has done a great deal to emphasize the fact that children have individualities of their own, and this very fact helps to put us on our guard against applying to children in general results which have been arrived at from the study of a few special cases. At the same time, whatever is found to be true of one child *may* be true of others also, even if not of all others. Accordingly, observations made on individual children should be repeated again and again in numerous other instances, in order to discover what is peculiar to the individual and what is of general application.

Observations made upon special groups of children should be treated in the same way; that is to say, they should be repeated again and again upon other groups in similar or dissimilar conditions. Thus, tests carried out in American schools should be repeated in England and other countries. Particular tests should be tried over again in different conditions. Thus, a test designed to discover the lines of growth of children's political ideas might be carried out during the excitement of a General Election, and repeated in another group of children at a time when the political atmosphere is calm. By repeating experiments a great number of times in different circumstances and in different places we may be able, on the one hand, to reach wider generalizations than the original experiment would justify, and on the other to set aside the influence of local and temporary conditions. At the same time, a new line of inquiry is opened up as to what the influence of local and temporary conditions may be, and so we may be led to new generalizations as to the effect of climate, race, politics, educational methods, and other factors upon the development of the child.

4. *In Application.*—Anyone who is familiar with the recent literature of child-study, and who asks what the practical

value of it all is for education, will admit that there is plenty of room for caution in the application of the results to practice. In the schoolroom we have to think not only of the natural growth-tendencies of developing mind, but of the direction in which we wish growth to proceed. Every teacher will admit that interest is one of his most powerful instruments for guiding the young minds in his charge. There are few studies which do not throw some light upon the question of what things, or what aspects of things, attract and interest children. But the pedagogical applications are often far from clear. Take, for example, children's interest in war. It is quite certain that war appeals strongly to children. Every boy delights to play with toy soldiers, to play at being a soldier, to read stories of the great deeds of the army and navy. We hear talk sometimes of introducing the teaching of the duty of patriotism into schools. As if every boy were not a thoroughgoing patriot already! Where is the English boy who does not unfeignedly believe that the British army has never been beaten, and that every British soldier is equal to at least three of any other kind? Now, granted that in our teaching we are to follow children's interests, what use are we to make of war? Are we to regard this interest as one to be encouraged? Shall we feed it by tales of war and battle? Shall our religious teaching centre about the Book of Joshua? Shall our histories be mainly records of fighting on land and sea? Recognizing that the military instinct stands for much that is good, shall we heap fuel on the fire by the tale of the little *Revenge* or the Light Brigade at Balaclava? Shall we strive to make the boy feel how his country's heroes call upon him for courage, and endurance, and faithfulness? Shall we people his imagination with King Arthurs and Sir Galahads, and the heroes of high romance? Or, on the other hand, realizing to what a great extent the child's interest is fired by the lust of power, and how deficient it is in any sense of pity or of wrong, shall we try, by the lessons of history, to bring home the horror and wickedness of war? Shall we strive to transmute the war interest, the love of fight and the pride of victory, into interests of another kind? Or, again, shall we try to choke it out by guiding development in other directions? Evidently it is one thing to discover a child's interests, but quite another to decide how these interests are to be used by the schoolmaster.

Consider, again, such studies as those in which Earl Barnes and others have brought out the child's attitude to punishment. These studies show that very young children look on punishment as an arbitrary means of getting even with the offender. They take no account of the circumstances of the case, and they tend to advise very severe forms of punishment. It is only by slow degrees that the child learns to look upon punishment as a means of preventing the culprit from repeating his offence and of frightening others from offending. A higher stage still has to be reached before the cause of the wrong-doing is sought in character, and punishment is used to cure the wrong-doer. This third stage, indeed, is seldom reached in childhood. Now, what bearing have these observations on the problems of discipline in childhood? Are we to modify our discipline according to the stage of development, treating the offences of young children, as Professor Barnes suggests, by immediate physical repression? In Professor Barnes' study, based on the story of the little girl who spoiled the furniture with her paints (p. 92), it is not until the children are twelve or thirteen years of age that we find any considerable proportion of them saying that they would explain to the child the mischief she had done, so that the treatment they advised was intended to prevent further mischief. Should we postpone subjective appeal until children reach this age? Professor Barnes seems to suggest that we should. It is evident that there is room for considerable caution in determining the application of studies of this kind.

5. *In avoiding Injury to the Children.*—Perhaps the most serious charge which is brought against child-study is that it is a kind of mental vivisection wherein the interests of the child are apt to be sacrificed to the interests of science. There is truth in the assertion that the attitude of the scientific investigator is different from that of the parent or teacher as parent or teacher. The investigator *must* collect and examine his facts by the cold dry light of science. The moment he allows any intrusion of emotion or sentiment to colour his results his observations cease to have any value for science. But while we must not allow our sentiments to dim our vision, or our prejudices to disturb our regard for truth, it is equally certain that we must undertake no investigations which our sympathies would not approve. The student would do well, therefore, to bear in mind the caution which Sir James Crichton-Browne addressed to parents and teachers a few years ago.

'Perhaps,' he said, 'parents and teachers would be gentler in their manipulations of the brain if they realized that it is of blood, of the consistence of firm jelly; that it is like a sponge full to the dripping-point; that it is made up of a starry firmament of cells, arranged in millions of constellations, and of a silvery filigree of fibres beside which the threads of the gossamer are coarse and clumsy cables. And perhaps, again, parents and teachers would be less exacting than they are in their demands on the brain, and less intolerant of its failures, could they be brought to picture to themselves its functional activity, now shimmering over its surface from point to point, like the aurora in the northern sky; now almost vanishing in intervals of slumberous ease; now flashing forth as in passionate emotion; now glowing with a steady light as in tranquil thought; now gathered into a spark of dazzling brightness, as in moments of concentrated attention. Those who thus think of the brain will, I am sure, approach the investigation of its products and the regulation of its machinery with nicety and caution, and therefore it is that I desire for those embarked in child-study a general acquaintance with its configuration and movements.'

Those who go the length of formulating a definite indictment against child-study usually say that it encourages the development of a morbid self-consciousness; or that it produces, or tends to produce, at an early age an unwholesome habit of introspection; or that it teaches the children to criticize the opinions or actions of their seniors.

I am not aware that any of these evils have resulted to any serious extent, but it will not be amiss to point out some lines of research which are attended with danger, and some which are open to criticism.

Some people go the length of saying that the mere discovery by a child that he is an object of investigation is sufficient to discountenance the entire proceeding. If this extreme view could be successfully maintained, it would soon put an end to the work of our child-study associations. In these days, when notices of child-study meetings arrive on post-cards, and the programmes and magazines of child-study associations are left lying about, it is scarcely possible for children to remain altogether insensible to what is going on. But, on the other hand, it must be remembered that children can stand, and even court, an amount of observation which their elders would find decidedly embarrassing. Observations upon a child's physical condition and upon his mastery of his bodily powers, at any rate, are likely to be welcomed by the child himself. It is probably wise, however, not to repeat observations of this kind very frequently. Imaginative children may very easily be led to think too much about their bodily health if the examinations are too frequent, or if they are not very judiciously managed. It is time we were learning from the Christian Scientists that the less we think about illness the better. If any defects are discovered during the examination, whether serious or trivial, absolutely no comment should be made in the presence of the child. If anything wrong is discovered, it should be communicated to the parent direct.

It is when we attempt to go beyond a simple physical examination that we really begin to meet with difficulty. It is obvious that our observations are not likely to be of much value if the children have any feeling that they are being observed for some purpose which they do not know. Such a feeling will certainly rob the children's expressions and activities of their naturalness and spontaneity; and if the observations awaken a suspicion that the observer is trying to find out things which, from the children's point of view, are none of his business, a feeling of resentment and a spirit of opposition will be aroused which will be fatal to the investigation. It is not easy to lay down any general rules for the guidance of those who are conducting inquiries, so much depends upon the nature of the inquiry, the relation of the inquirer to the children, and what the children are accustomed to. An inquiry which might be safely and satisfactorily carried out by one teacher holding particularly sympathetic relations with her class might be open to very serious objection if repeated by another or by a stranger. We have an example of this in a case quoted by Professor Earl Barnes, where a class of fifty children in a London Board School were asked to write an essay on 'Hell.' It is obvious that only very exceptional circumstances could justify the setting of such a composition. In fact, I think it could only be justified if the children had quite recently been receiving instruction in the Christian doctrine of a future state. In such a case the children would doubtless treat the essay as a sort of examination upon what they had been taught, and would try to reproduce the opinions expressed by the teacher. This seems to have been the case in the instance recorded. Regarded in this way, the essay set may not only have been justifiable, but have been of value to the teacher in indicating the effect of the lessons given. But the value of such a test for child-study is quite another matter.

Some class tests are open to the objection that they can scarcely fail to suggest that there is some ulterior object in view. Such an idea will be confirmed if it is found that the same test has been applied throughout a school, and suspicion will become a certainty if the papers are taken away and never heard of again.

A further objection to many tests is that they almost invite the children to give imaginative answers instead of replying truthfully.

The much-used test of the development of the 'money sense' in children—'If you had sixpence a week to do with as you liked, what would you do with it?'—has been objected to on both grounds. When this test was used in Edinburgh, only three boys out of several hundreds said that they would buy cigarettes, and these three were probably speaking in bravado. There can be no doubt that a great many boys thought what a lot of cigarettes they would buy, but did not care to say so.

These objections do not necessarily invalidate a test. If the children suspect that the question is a test of some sort, a few may refuse to answer, and a few may say not what they think, but what they think the examiner would like. But as long as the children do not know *what* one is after, a few fancy answers do not affect the general result.

However, the objections which have been mentioned suggest that the best tests are those which fit in with the ordinary school work and can be actually used as class exercises before being collected and examined from the investigator's point of view. Essays written by the children should be corrected for spelling and grammar, and marks may be given for composition. Some tests, again, may be distinctly educative. One very favourite form of test is to tell the children a story designed to ascertain some special point, and then to ask the children to reproduce it from memory. It is obvious that a test of this sort must be of great value to the teacher in indicating the capacity of her pupils to profit by oral instruction, and may reveal deficiencies or peculiarities which require individual attention. The special design of the story will not interfere with its usefulness for ordinary class purposes; and after the individual teachers have quite finished with the papers, these may be sent off to the investigator for examination and tabulation. The series of questions which Mrs. Barnes made use of in studying the development of the historic sense in children must make most admirable class exercises.

Questions which aim directly at children's private thoughts and feelings, or at their ideas about moral or religious subjects, are open to the objection that they tend to excite introspection, which is unnatural and unhealthy for the child. Opinions, naturally, will differ widely as to what questions of this kind are permissible. Our American cousins seem to have no sort of scruple about asking questions which most of us on this side of the Atlantic would regard as of much too intimate a nature. Doubtless this is due to the much freer intellectual attitude of the States. The adult American is candid to a fault as to his own opinions about everything in heaven above or in the earth beneath, and the feeling not uncommon in England that people may regard one as peculiar or objectionable if one expresses opinions different from theirs is altogether unintelligible to him. The characteristic English reticence is illustrated very well by the story of the bishop's wife who said: 'I don't understand this talk in the papers about freedom of opinion. I go about a great deal, and I never heard anyone express an opinion that was not perfectly orthodox.' The American, on the other hand, perfectly free in expressing his thoughts, does not see why he should not ask any questions which occur to him. Surely no one but an American could gravely set down in a syllabus the request, 'State some bottom facts regarding your own religious experiences.' When such questions are asked, and apparently freely answered by youths and adults, we can scarcely wonder at the *questionnaires* which have been addressed to children. What are we to think of such queries as these? 'Death—why do people die? Where do they go? Hell—what must a person do to go there? What is it like? Angels—what do they do? Ghosts—what can they do?' Such topics may be suitable for private discussion in the sympathetic relationship of teacher and taught. But in a syllabus addressed impersonally to all sorts and conditions of children? I think not.

CHAPTER IV

BIOLOGY AND CHILD-STUDY

> 'Out of the deep, my child, out of the deep,
> Through all this changing world of changeless law.'
>
> TENNYSON.

THE study of children very obviously constitutes a chapter in the story of what our fathers called animated nature. The task of the student is analogous to that of the old-fashioned naturalist, who wandered about the moors and forests, observing the ways of the wild folks, furred and feathered, who dwelt therein.

No doubt there are obstacles in the way of studying children as one studies wild creatures in their haunts, for, as Dr. Louis Robinson, in one of his charming essays on evolution, laments, the nursery is very much of a close preserve, to which the mere man, at any rate, has some difficulty in gaining access. But obstacles are made to be overcome, and the naturalist who is determined to observe the ways of the little new-comers into our human world will find opportunities for doing so.

The simple observation of young children, however, cannot proceed very far before one discovers many puzzling traits which are difficult to explain by anything in adult human nature; and many questions are sure to arise in the thoughtful mind which really belong to the larger domain of biology, and which one could never answer by investigations restricted to childhood.

Indeed, the very first question which we might expect to occur to the student is one of this kind. The moment one begins to study children one discovers that a child is not simply a miniature adult. Bodily and mentally the child differs from the adult in a truly amazing degree—as much as if he belonged to a totally different species, some one says. The question therefore arises, What is a child? This is one of those questions which are apparently very simple, but which are by no means easy to answer satisfactorily, as one finds out when one makes the attempt. What light biology can throw upon the subject we shall consider briefly further on.

Many of the ways of children, also, are so different from adult ways that it is exceedingly difficult for the grown-up mind to understand them at all. But when we compare the ways of children with the ways of other young things, we find that many of the curious things they do have their analogues in other living creatures; and studies of the instincts of animals have given us much assistance in the interpretation of many childish characteristics.

It is to biology, too, that we must turn for light on the problems of heredity, and also on various sociological questions in which children are much concerned—such questions, for example, as the diminution of infantile mortality, and the possible effect upon the race of the preservation of the lives of sickly and delicate children.

The theory of evolution has recently taken a very strong hold on the imagination of many students of children, to whom Johnnie's naughty ways are obviously a recrudescence of the disagreeable habits of primitive man, while as for baby, he is left with nothing he can call his own.

Every characteristic he possesses, from the hair on his bonny head to the very wrinkles on his little feet, is inherited from ancestors who lived on this earth millions of years ago, and some of whom must have been very weird creatures indeed, if all said is true. While I do not doubt for a moment that Darwinism has a legitimate place in the nursery, I am afraid there has been a good deal of somewhat incautious theorizing of late, with but little care to distinguish between what is proved, what is probable, and what is very improbable indeed.

Some of the questions upon which biology has a bearing will be considered in other chapters. A few may be discussed briefly here.

THE CONSCIOUSNESS OF CHILDREN.

I have already said that it is very difficult to picture to ourselves the consciousness of young children. It is certainly very different from our own present consciousness, and very different even from anything we can remember from our childhood. In trying to understand what a baby's consciousness is like, we must rely (1) on the study of the state of development of the brain and sense-organs, and our knowledge of their functions, and (2) on inferences drawn from the baby's acts, and its reactions in presence of various stimuli.

It may seem a little far-fetched to seek help from the study of animals, whose consciousness is certainly farther removed from our own than is that of the child. But studies of animal life do help us, and that for two reasons. In the first place, it is easier to realize, when we are studying an animal than when we are studying a baby, that our observations are directed upon a creature radically different from ourselves, and that our conclusions cannot amount to more than a guess at the mental state which the animal's actions reveal. It is therefore a little less difficult —I do not say it is easy—to escape the fallacy, which we can scarcely avoid in studying children, of interpreting their actions in terms of the states of mind which they would imply in ourselves. In the second place, animals, to a far greater extent than babies, have attracted the attention of men who have made a special study of both biology and psychology, and in works dealing with animal instinct and intelligence we may find discussions of the subject of animal consciousness which are likely to help us in interpreting what we observe in children.

Amongst attempted descriptions of animal consciousness I think the following by Dr. Thorndike (quoted by Professor Lloyd Morgan) is probably very applicable to the baby consciousness at an early period:

'One who has watched the life of a cat or dog for a month or more under test conditions gets, or fancies he gets, a fairly definite idea of what the intellectual [intelligent] life of a cat or dog feels like. It is most like what we feel when consciousness contains little thought about anything—when we feel the sense-impressions in their first intention, so to speak; when we feel our own body and the impulses we give to it. Sometimes one gets this animal consciousness for a while—in swimming, for example. One feels the water, the sky, the birds above, but with no thoughts about them, or memories of how they looked at other times, or æsthetic judgments about their beauty; one feels no ideas about what movements he will make, but feels himself make them, feels his body throughout. Self-consciousness dies away. Social consciousness dies away. The meanings, and values, and connexions of things die away. One feels sense-impressions, has impulses, feels the movements he makes; that is all.'

Dr. Thorndike has succeeded in a wonderful way in getting back to the sort of undifferentiated consciousness which a young infant must possess. His description seems to me more successful than the often-quoted sentence of Professor James, who says, speaking of the consciousness of the infant, that 'the body, assailed by eyes, ears, nose, skin, and entrails at once, feels it all as one great, blooming, buzzing confusion.' No doubt the innumerable sensations which pour in from the various organs of sense are for some time only vaguely defined, and unrelated, or very indefinitely related, one to another. For a time they call up no associations, and fail to be interpreted in terms of past experiences. But we need not imagine that a consciousness of this sort, which to us must appear quite chaotic, need be associated with any sense of confusion in the mind of the infant.

When we observe a baby who is beginning to regard with lively attention the more striking objects about it, and to discriminate form and colour and touch and sound, we must remember that things have not for it the 'meanings, and values, and connexions' which they have for us. The baby simply feels the various sense-impressions as they come, and leaves them to weave in consciousness the pattern of the world without. The first knowledge of the world does not result from the struggle of the mind to unravel the tangled elements of consciousness. Mind itself has its birth and its awakening, and the ordering of experience, the development of perception and memory, and the dawn of the idea of the outside world, come not of effort, but of the creative working of the forces of heredity.

Evolution and Child-Study.

The doctrine that the higher forms of life are descended from lower and simpler forms is supported by proof so ample that we may safely accept it, not simply as a more or less probable theory, but as one of the most assured results of science. It is true that many even of those who accept the general theory of evolution have hesitated to believe that man himself can be descended from non-human ancestors. The gap between man and the most intelligent animal is so enormous that such hesitation was inevitable quite apart from the obstructive force of theological or other prepossessions regarding man's origin. But the more the question has been studied the more inevitable has become the conclusion that man forms no exception to the general rule. Man is no creation of yesterday. He did not suddenly spring into being fully formed in the year 4004 B.C., at three o'clock on a Friday afternoon, as Archbishop Usher had the temerity to declare. On the contrary, his line of descent passes back for untold æons to the first existing living things. He has, indeed, been raised up out of the dust of the earth, but in a fashion infinitely more marvellous than was ever revealed to the imagination of ancient myth-makers.

It would be altogether out of place to attempt here even the very slightest sketch of the facts upon which the theory of evolution depends. For the general proof of the doctrine, the student may be referred to Darwin's *Origin of Species*, of which several cheap editions have been published lately; while the special facts bearing on the descent of man will be found in Darwin's classical work on the subject and in Haeckel's *Evolution of Man*.

Let us, then, accept the theory as proved, and consider some of its bearings on the study of children.

THE COURSE OF PRENATAL DEVELOPMENT.

The most remarkable corroboration of the general theory of evolution is found in the history of individual development. Before the microscope was invented it was possible for men to believe that the eggs of the various species of animals contained an embryo too minute to be clearly discerned by the eye, but which yet possessed all the organs of the adult form, and which only required to increase in size until the time came for liberation from the egg. But the study of embryology by means of the powerful microscopes of the present day has shown that every living thing actually begins life as a single cell—that is to say, as a minute speck of jelly-like protoplasm, which contains in its interior a denser kernel or nucleus. This cell, the essential part of the egg, if examined at the earliest period of its existence, and before it has become provided with such necessaries as food-yolk and albumen and shell, has positively no characteristics which give one even a hint as to the kind of animal into which it is to develop. The immature egg cell which is to become a fish cannot be distinguished from that which is to become a bird or a mammal. The star-fish and the octopus, the minnow and the salmon, the frog and the chick, the mouse and the man, all alike begin their individual lives in the form of a single nucleated cell. However familiar this statement may be, it is none the less an astounding one. And observe, it is not the statement of a theory, but of a fact. When we speak of developing ova, and embryos, and larvæ, we speak of things which can be actually seen and examined. The course of development of a large variety of animals has been most carefully and fully worked out, and the histories which have been recorded—the histories of the actual stages through which individual animals pass as part of their life-history—are amongst the strangest and most wonderful of the fairy-tales of science.

In the course of human development, as in the development of all animals above the very lowest, the first change that takes place, after fertilization, consists in a division and subdivision of the original cell into a little mass of cells. The first cell divides into two, the two into four, the four into eight, the eight into sixteen, and so on in geometrical progression. From a very early stage, perhaps from the very first division, the cells which are formed differ a little from one another. The various cells soon begin to arrange themselves in groups, in tissues, in organs. The whole process takes place in so orderly and methodical a manner that Professor Huxley says an observer can scarcely help feeling that the cells are being arranged by some unseen builder. The strangest thing of all, however, is that an observer watching the whole process, if the whole process could actually be watched without interruption, would find himself continually making guesses as to the kind of creature that was being formed, and would find himself continually wrong.

Perhaps we ourselves in our childhood may have watched a potter at his wheel, and may have tried to guess what work was in progress as we saw the original formless lump of clay flattened into a disc, and moulded successively into the form of a plate, of a saucer, of a bowl, of a jar, until at length—perhaps after the addition of spout and handle—the perfect article stood revealed. Just so is it with this mysterious group of living cells. At an early stage they arrange themselves in a form which inevitably suggests the development of some lowly relative of the sea-anemone, such as the hydra of our ponds. But no! Just as we expect to see the tentacles beginning to appear, the plan seems to change, and there is a suggestion of the embryo of some of the worm-like creatures whose larval forms may be found leading a free-swimming existence in the sea. But this stage, toò, passes by. In a short time the embryo assumes an elongated form. A faint groove may be traced running along the surface, and some of the cells become arranged in little solid masses placed one behind the other in a row. The observer now realizes that the whole invertebrate kingdom has been passed. The little groove which has appeared indicates an early stage in the formation of such a nervous system as vertebrates alone possess; and the solid masses of cells are the protovertebræ, whose presence is a certain sign of the appearance of a spinal column.

The process under observation is, then, the development of some member of the great backboned family. But what? Surely a fish. For now one end of the embryo has become differentiated into an evident head, and at the side of the neck are deep grooves or fissures, which can be nothing else than gill-slits, such as used to exist in primitive fishes, and are still found in such forms as the lamprey. The heart, too, now observed beating more or less vigorously, is a very simple organ, such as may be found in fishes, and quite different from the complex four-chambered structure found in mammals and birds.

But the embryo does not become a fish. This stage also, like those which have preceded it, passes away. From the gullet may now be observed growing a little pouch, which at first appears as if it might be going to form the swim-bladder of a fish, but which soon becomes subdivided into a pair of sac-like lungs. Evidently, then, we are dealing with an air-breathing vertebrate, but the characteristics which are present suggest the embryo of some lowly form of amphibian.

But further changes soon leave the amphibian stage behind. The lungs become more complex in structure. The heart develops into a four-chambered organ. The great bloodvessels become arranged in the fashion peculiar to mammals, but there is still nothing to suggest the human form divine. On the contrary, the general form of the body, the short limbs, the tail, all seem to belong to some lower type of mammal.

From this time onwards, however, human characteristics become more and more apparent. We need not trace the process in detail. Suffice it to say that the head increases in size with the growth of the brain, the limbs develop into recognizable arms and legs, the tail disappears, and eventually the embryo—now termed a fœtus—assumes the form and characters of the human infant.

Such is a very brief and a very imperfect sketch of a few of the strange phenomena which may be observed in the course of human development. 'The human form does not begin as a human form. It begins as an animal, and at first, and for a long time to come, there is nothing wearing the remotest semblance of humanity. What meets the eye is a vast procession of lower forms of life—a succession of strange inhuman creatures emerging from a crowd of still stranger and still more inhuman creatures; and it is only after a prolonged and unrecognizable series of metamorphoses that they culminate in some faint likeness to the image of him who is one of the newest yet the oldest of created things.'[1]

This amazing story of man's development is not brought forward here as any proof of the doctrine of evolution. But if we accept the theory of evolution, as we have accepted it for the purpose of this chapter, it will at once be seen that the story of development is a brief summary of the story of descent. So, at least, evolutionists inter-

[1] Henry Drummond, *The Ascent of Man.*

pret the metamorphoses that have been described. In Haeckel's well-known phrase, ontogeny repeats phylogeny —the development of the individual repeats the development of the race. This is the doctrine of recapitulation—a doctrine which is to be interpreted in a wide and metaphorical sense. The student must beware of the popular travesty of the doctrine, to the effect that the human embryo at one stage is a little fish, at another a little amphibian, and so on. The embryo does in some respects resemble a fish embryo. Fish-like characters do appear. But the fish stage is passed by without being passed through. A tadpole is not a fish, but it does possess some fish-like characters. It has gill-slits and gills; it has a two-chambered heart; it leads a purely aquatic existence, and dies if taken out of the water. But it develops, not into a fish, but into an amphibian. The recapitulation theory interprets the tadpole stage as an indication that the frog comes of a fish-like ancestry.

Another fallacy, which has attracted less attention than it deserves, should also be pointed out. This is the common idea that every character which appears in the course of individual development points to the possession of a similar character by the more or less remote ancestors. This, however, is by no means the case. Many young fishes, for instance, escape from the egg while they have still attached to them an enormous mass of good yolk, but we need not imagine that their ancestors ever habitually carried such a burden. Again, an enormous number of marine animals pass through a free-swimming larval stage. Now, practically all these larvæ are perfectly transparent; but it does not follow that the marine animals in question are all descended from transparent ancestors. Birds pass through the chief stages of their metamorphoses enclosed within an eggshell; but it is impossible to imagine that their ancestors were hermits, who passed existence in similar cells. The fact is that natural selection acts upon young as well as upon old. At every stage of existence it is necessary for every living thing to be adapted to its environment. Hence, while many characters which appear in the course of development can only be explained as recapitulatory, others are clearly individual and adaptive. The food-yolk of the young fish gives them a better chance of surviving until they are capable of securing sufficient food by their own effort. The transparency of the marine larvæ has been acquired to render them less visible to their enemies. The eggshell is a protective adaptation of no recapitulatory significance.

The recapitulation of ancestral history which occurs during individual development is, then, of a very general kind. Some ancestral stages are suppressed altogether; others are modified to suit present needs. Ontogeny is no slave to tradition, and at any stage new elements may appear which have no phylogenetic significance. These remarks are of practical importance, as we shall see, in connexion with the popular theory that educational methods should aim at leading the child along the path of race progress.

Darwinism in the Nursery.

If the period of prenatal development may be regarded as in a sense a summary of prehuman history, the early years of childhood may be regarded in a similar sense as an epitome of the human period. But as the evolution of man from animal was a slow and gradual process, we may expect to find traces of our prehuman ancestors still surviving in infancy, and even persisting to a later period.

The significance of the kind of traces for which we are about to look may, perhaps, be rendered clearer by an example taken from quite a different field. The familiar barber's pole is frequently painted spirally in white and red, and bears suspended from its extremity a metal plate or saucer. Now, this is a very curious sign, for neither the painted pole nor the dish have anything to do with the tonsorial art. For an explanation of their significance we must go back to the time when the profession of the surgeon had not evolved from the craft of the barber. The dish is, in fact, a bleeding-dish, and the spirals painted upon the pole represent the bandages which were used to bind up the wound after sufficient blood had been withdrawn.

In a similar way, in our domestic animals, which are known to be derived from wild species, many traits may be discovered by the attentive student which seem quite out of place in the present circumstances of their existence, and which, indeed, are intelligible only as survivals from the wild life of ancient times.

Now, the human body is fearfully and wonderfully made, and many learned and pious treatises have described in great fulness of detail the marvellous perfection of its structure and the extraordinary adaptation of its various parts to the functions they severally perform. But sceptical investigators have not failed to point out the presence here and there of curious anomalies which seem somewhat at variance with the theories of Bridgewater treatises, and which, indeed, are altogether unintelligible except in the light of the doctrine of descent.

One of the most convincing of these is found in the arrangement of the valves of the veins. These valves allow the blood to flow in one direction only, and they are, therefore, of the greatest value wherever the blood has to flow against gravity. Some of the veins only are provided with valves, and one would expect to find that the veins which have valves are those in which the blood has to flow in an upward direction. Now this is exactly what is the case in our own veins—whenever we go on all-fours! But when we assume the upright posture the blood has to flow upwards in some veins which have no valves (*e.g.*, the great vena cava), while some veins in which the blood flows horizontally, and where valves are needless, are provided with them. This distribution of the valves obviously accords very well with the theory that it is only in comparatively recent times—recent, that is to say, in a geological sense—that man has assumed the erect posture. The persistence of the present distribution of the valves is unfortunate for mankind, inasmuch as it is responsible for several of the ills to which our flesh is heir.

The curious anomaly which has just been described is only one of many, but it will suffice as an example of the anatomical peculiarities which are not evident to the superficial observer. It is not necessary, however, for the student of children to penetrate beneath the surface in order to discover characters which have a similar significance, although their meaning may not at first sight be quite so apparent.

Interest in this subject has chiefly centred around what are called the monkey traits of children. I need scarcely say that no evolutionist believes that men are descended from monkeys, but it is held that if man's line of descent is traced far enough back it will somewhere meet the stock from which our existing monkeys and apes are descended. During the immense period in which the evolution of man has taken place the race of monkeys has also been evolved. Men and monkeys have, in fact, diverged from a common stock. How far back in the mammalian series we should have to go before reaching the common stock, or what the common ancestor was like, we have really no idea. Professor Osborne[1] tells us that it must have been 'a small terrestrial mammal, either insectivorous or omnivorous in its habits,' and no cautious evolutionist would risk being much more definite.

If the theory of recapitulation is true, we ought to find that the young, both of men and of monkeys, being nearer the common ancestor than the adults, are more like one another. And this is precisely what we do find. The young of the great anthropoid apes, which are the most nearly allied to the human species, are actually much more like the human body in their structure and appearance than is the adult form like the full-grown man.

Although the common ancestor of man and monkey may have been, as Professor Osborne tells us, a terrestrial animal, it is generally believed that our ancestors passed through an arboreal stage. Some bold speculators profess to find in the manner in which nurses rock children to sleep a reminiscence of the swaying movements of the branches of our ancestral home, and have even pressed into service the words of the nursery rhyme:

> 'Hush-a-bye, baby, on the tree-top,
> When the wind blows the cradle will rock.'

The argument may not be much better than the rhyme, but it is certainly difficult to say what cradles really have to do with tree-tops! We are on surer ground when we turn to some of the baby's own characteristics. Of these, the most interesting and striking is the extraordinary clinging power possessed by young infants. Although no one who has had anything to do with infants can have failed to notice their strength of grasp, I think Dr. Louis Robinson was the first to point out that nearly all young infants can cling so firmly to a stick or finger as to sustain the

[1] *Nature*, vol. lviii., p. 427.

entire weight of their bodies. Out of sixty children less than an hour old on whom Dr. Robinson tried the experiment, all but two were able to hold themselves suspended for at least ten seconds, while twelve held on for half a minute, and three or four for nearly a whole minute. This clinging power increases for two or three weeks. Dr. Robinson regards this power as a survival from a time when children clung to their mothers, whose hands were occupied in climbing from branch to branch. It is well known that young apes cling to their mothers in this way. Readers of Wallace's *Malay Archipelago* will remember how the young orang-outang which Mr. Wallace captured clung so tightly to his beard that he had the greatest difficulty in getting free.

If ability to cling tightly was once a matter of vital importance, one may imagine that the feet must have shared the responsibility with the arms. Such a supposition is distinctly borne out by an examination of the infant's foot. Inspection shows that the great toe is set slightly apart from the others, and that it has a wide range of mobility. Indeed, it can, with great ease, be brought into apposition with any of the other toes. There will be noticed in many infants a furrow on the sole of the foot running in the direction of its long axis, and most marked in the fore part of the foot. This furrow becomes much deeper if the foot is doubled over, as it were, so as to bring the great toe and the little toe into apposition. The furrow is, in fact, a flexion fold similar to the lines on the palm of the hand. This fold seems usually to disappear before adult life is reached. Its presence in infants seems referable to a time when the apposition of the great toe to the others, still easily effected by passive manipulation, could be carried out as a voluntary movement. Even yet the infant has a much greater power of voluntarily moving the toes than the adult. Doubtless the loss of this power is due mainly to the cramping effect of foot-gear.

When the feet were used for clasping the mother or the branches of trees they must have been kept more or less habitually in the inverted position. This posture survives in the infant till the present day. At birth, and for some time afterwards, the infant's feet are naturally kept turned in, so that the mother often fears that her child has club-foot. This posture is most noticeable shortly after birth, but it persists for a considerable period. After the child has learned to sit upright the feet are often kept turned inwards with their soles in apposition to each other. Dr. Mumford points out that this attitude is a very favourite one with monkeys.

Closely allied to the clasping power is the child's love of climbing. This may be quite evident as soon as the child is able to move about by itself; and as the power of locomotion becomes more perfect, so does the love of climbing become more dominant. The child manifests great delight when it finds itself able to climb the stairs, and its efforts to mount on the top of articles of furniture, if not always judicious, are persevering and daring. Miss Shinn says of her niece, in her twenty-third week, 'She is bewitched with climbing.' There can be no doubt that climbing is a splendid exercise for the child, and one which should be encouraged, care being taken, of course, to prevent accidents. The child's clothes, at the time this instinct becomes strong, should be so made as to give the freest play to the limbs.

Some naturalists refer to four-footed progression as a survival movement, and Mr. Buckman has published an excellent snap-shot of a child running along on all-fours like a dog. It seems to me that the surprising thing is that this mode of progression is so comparatively uncommon. It is certainly a very effective means of getting about, but is much less common than creeping, hitching, or rolling. Its comparative rarity may be due to the fact that during the arboreal period our ancestors seldom descended to the ground, and so the art of running on four legs was lost. Or children may not naturally adopt it owing to the unequal length of the legs and arms. Or, again, the clothes may be a disturbing factor. The influence of clothes on the mode of locomotion adopted by the infant deserves further study. It is evident that a skirt is a very annoying thing when one wishes to creep. A skirt that is just long enough to interfere with creeping may be made to clear the ground by going on all-fours; but if the skirt is made only a little longer it will interfere with this mode of locomotion also, by getting trodden on. Consequently the child may find hitching or rolling a more satisfactory means of getting about. I am not aware that anyone has attempted to explain either of the last two methods as survivals, and I am disposed to think that the means of progression actually adopted by the child before it can walk is determined by the more or less accidental discovery of *a* means of getting from one place to another.

Among minor characteristics which have a bearing on the question of man's descent is a tiny fibrous nodule which is commonly present in the incurved margin of the ear. Darwin regards this as the representative of the point of the ear before the edge became curled inwards. He points out that sculptors and painters represent the figure of Puck with a pointed ear, like that of animals. In this connexion it may be noted that, although man is unable to move his ears as an animal can do, he yet possesses muscles which pass from the skull to the ear, and which are identical in arrangement with the muscles by which the movements of the ear are effected in animals. These muscles, however, are very small, and have ceased to be under voluntary control. A few people can move the ears very slightly, but even in such cases the movement is generally effected mainly by moving the scalp.

Another minor character is the presence of a rudiment of the tail. This is very noticeable in the skeleton, but even during life the tip of the coccyx, as the rudimentary tail is termed, can easily be felt through the skin. This coccyx consists of three or four minute caudal vertebræ which have become fused together.

The arrangement of the hair on the surface of the body is of some interest. If any part of the body is carefully examined, it will be found that the hairs have a general tendency to lie in a particular direction. Thus, in the upper limb the set of the hair is towards the elbow, and in the lower limb it is away from the knee. This arrangement corresponds with what is found in monkeys. The usual explanation of this arrangement is that, if a monkey is caught in a shower of rain and is unable to find shelter, all it has to do is to sit down with its head resting on its hands and its elbows on its knees, when its hair, all being directed downwards, will form a sort of natural thatch which will conduct the water to the ground. If the explanation is not altogether convincing, it is at least ingenious, and I am unable to furnish a better.

Survival phenomena are not confined to the child's body. The instincts of children, if less precise than those of many animals, are certainly innate and hereditary, and have their own tale to tell of a time when instinct had a larger part to play in the conduct of life than at present. Many of the instinctive and unreasoning fears of little children seem to belong to conditions of existence which have long since passed away. The pugnacity and quarrelsomeness of children, their voracity, their cruelty, their jealousy, their acquisitiveness seem to belong to an uncivilized stage of human existence. The extraordinary restlessness of children, their imitativeness, and their curiosity are characters which they share with the monkeys. Mr. Buckman notes their tendency to pick at anything loose, such as wall-paper, as a 'survival of bark-picking in search of insects.' The tendency of young children to sleep on their stomachs with their legs drawn up is noteworthy. Monkeys often adopt a precisely similar attitude.

Some writers attempt to find in children the records of a past even more remote than that to which the various peculiarities already mentioned refer. Dr. Bolton,[1] for example, regards some of the rhythmic movements of children, such as their tendency to rock backward and forward, as 'recrudescences of former aquatic life.' The intense delight babies take in bathing and in splashing about in water suggests 'a survival of the old-time life in an aquatic medium.' Dr. Mumford,[2] also, treats the irregular and rhythmical spontaneous movements of early infancy as possible survival movements dating back to the aquatic ancestry of man. It has even been suggested that the gliding, swimming, floating sensations sometimes experienced during sleep may have a similar significance—that they may, to quote Professor Stanley Hall, be 'faint, reminiscent, atavistic echoes from the primeval sea.' To this theory there are two great objections. The first is the inconceivable remoteness of the period to which the theory carries us back. I have already mentioned that an aquatic ancestry is indicated by certain phases of development, but these are left behind at a very early

[1] 'Hydro-psychoses,' *Am. J. of Psych.*, vol. x., 1898.

[2] *Brain*, vol. xx., 1897.

stage of gestation. The second objection is that the infant at birth is obviously human, and although we can understand, and indeed would expect, the presence of characters belonging to the immediately prehuman stage, we certainly would not expect to find these mixed up with characters which belong to totally different conditions of existence.

THE CHILD AND THE RACE.

That a certain parallelism exists between the development of the child and the race has long been observed. 'Although the world in general advances,' says Goethe, 'the youth must always start from the beginning, and as an individual traverse the epochs of the world's culture.' The recapitulation doctrine of the modern evolutionist school has awakened fresh interest in the subject, and the Herbartians have been especially active in the propagation of the view that the child's mental pabulum must be carefully chosen in accordance with the 'culture epochs' which have marked the progress of mankind from barbarism to civilization.

Unfortunately, it is by no means easy to determine what these culture epochs really were. Of the later stages of human progress we do know something, but of the immense period which is covered by the word 'prehistoric,' we really know very little. Prehistoric man has come and gone, and has left behind him, on the whole, surprisingly little token of his presence. Here and there we find a few flint arrow-heads, a stone hatchet, a needle made of bone. These tell us of a race of men given to war and the chase, who used tools, who wore clothes. A picture scratched upon a bone may reveal something of the life they lived. A burnt bone may show a knowledge of fire. But, taken altogether, our knowledge is very scanty, and the various schemes which profess to describe the development of man are really highly conjectural. Nor can it be said that the study of the lower races of man has been found an altogether reliable guide to the problem before us. The savage is himself a product of evolution, and no existing savages can set up an undisputed claim to be the nearest representatives of primitive man.

One thing which seems to be fairly certain is that the various races of men did not reach the present stage of culture along any definite route. In the Old World, for example, domestic animals played a very important part in human progress, but not in the New. Again, it seems pretty evident that man must have lived a predatory existence before he took seriously to agriculture. Yet agricultural peoples are not always superior to those who live by hunting and war. The warlike Masai, for example, were physically and mentally superior to many of the agricultural tribes around them.

Upon the whole, it would seem that the safest guide to the child's educational needs is neither primitive man nor the modern savage, but the child himself. But the indefiniteness of the periods of childhood is clearly shown by the multiplicity of the attempts to define them. In a very useful chapter in Chamberlain's work on *The Child* we have a summary of a large amount of literature on this subject. From this it is apparent that the periods of childhood differ greatly according to the basis of classification chosen. Thus, we may divide the period of childhood into 'ages' physiological or 'ages' anatomical. We may trace a definite succession of stages in the evolution of language, or in the development of the imagination. One writer adopts play as the basis of division, another the periodicity of growth, and a third the development of the senses. In each case the number of periods and the ages involved are different.

Perhaps the boldest attempt to bring the stages of child-life into line with racial development is that of Professor Woods Hutchinson.[1] This writer recognizes (1) a 'root-and-grub' stage lasting from birth to about five years, in which the mouth is 'the criterion of all things'; (2) a 'hunting-and-capture' stage, lasting from about four till twelve, and characterized by fear of strangers, cruelty, and indifference to pain (the dominant instincts are shown in the games of the period—bo-peep, hide-and-seek, tig, Tom Tiddler's ground, etc.); (3) a pastoral stage, extending from about nine to twelve, characterized by a fondness for keeping pets, digging caves, building huts; (4) an agricultural stage, from twelve to sixteen, characterized by the development of foresight and by a love of gardening; and (5) a shop and commercial stage, extending from fourteen onwards, characterized by bulging pockets, 'swapping,' demanding pay for services, and a recognition of the value and 'sense' of arithmetic.

Professor Hutchinson looks forward to the arrangement of the school curriculum in accordance with these stages, which do not seem to differ materially from the culture epochs advocated by the Herbartians. If the sacred multiplication table, he says, could be reserved till the fifth stage, when children see the 'sense' of it, 'it would be keenly enjoyed instead of hated as a "grind," and mastered in no time.'

Although the periods of child-life are not sharply defined, the recognition of the fact that development does proceed through a series of stages marked by different instincts, interests, and powers of comprehension is of the greatest importance to the educator. The teaching of biology is

[1] *Educ. Times* (London), vol. lii., 1899. Quoted by Chamberlain.

entirely on the side of those who deliberately select their culture material to meet the needs of each age, and who aim at guiding the child through the chief phases of racial progress. But it may not be amiss to say that Nature is never exact in her recapitulations of the past. She does not hesitate to take short-cuts, nor to suppress altogether stages which cease to be steps to something higher. We have seen, also, that it is in accord with her method to introduce at any stage altogether fresh adaptations to present needs—as, for example, in the adaptive transparency of surface larvæ. It is, no doubt, a big slip from a trochosphere to a twentieth-century child, but these things are a parable. The child himself, as a rule, seems to recognize quite clearly the century he belongs to. If we feel constrained to present him with a tent because Abraham lived in one, he no doubt enters into the spirit of the thing and accepts it joyfully. But he also annexes the ball of string and the coffee canister to fit up telephonic communication with the nursery.

Heredity.

Modern biology may claim to have thrown a great deal of new light upon the problems of heredity. The microscopical investigation of developing germ cells has provided us with invaluable information concerning the material basis of inheritance. Statistical studies, such as have been carried out by Galton and Karl Pearson, have proved fruitful methods of study; while, at the present time, the experimental propagation of animals and plants on a large scale is being made use of in order that the facts of heredity may be followed through a large number of generations.

For our present purpose it is not necessary to enter into biological details. Two aspects of heredity alone claim our attention.

(*a*) *The Inevitableness of Heredity.*—There is a curious popular idea that heredity is a kind of Fate in whose meshes we are entangled at birth, and from which, struggle as we may, we cannot escape. Some people actually write of 'the dreadful doctrine of heredity.' They seem to think that heredity is a kind of bogie invented by scientific men in order to frighten poor humanity. Such people seem to have got hold of the notion that heredity means that if our father has died of cancer, we shall inevitably fall victims to the same fell disease; or that, if a man is a drunkard and a rogue, it is worse than mockery to teach his children to pray for grace to live a godly, righteous, and sober life.

Now, however 'dreadful' the laws of heredity may be, it is quite certain that we cannot escape from them. 'Facts are chiels that winna ding,' and the wise man will therefore try to make the best of them. But notions such as I have cited are based on a serious misconception of what modern teaching regarding heredity really is.

It is quite true that there is a good deal of inevitableness about heredity. At the time of birth it is already inevitably determined that the child is—a child! That one generation resembles another is a commonplace of observation. It is, moreover, determined beyond recall whether the child is a boy or a girl. Even minuter characteristics are quite obviously established. During childhood we may observe the appearance of peculiarities which can be traced to one or other parent, or even to grandparents. Such resemblances do not arise by chance, but appear in accordance with law. Galton, as the result of his studies, has been able to formulate a law of ancestral inheritance which he states as follows: 'Each parent contributes on an average one quarter, or $(0{\cdot}5)^2$, each grandparent one-sixteenth, or $(0{\cdot}5)^4$, and so on, and that generally the occupier of each ancestral place in the n^{th} degree, whatever be the value of n, contributes $(0 \cdot 5)^{2n}$ of the heritage.' Recent observations seem to show that this law may not be absolutely accurate, but it may, at any rate, be taken as approximately true.

So far as we have gone, then, there is something to be said for the view that the doctrine of heredity is a kind of scientific determinism. But a new light is at once thrown on the subject when it is stated that the burden of heredity includes a number of possibilities and potentialities—possibilities which may or may not be fulfilled, potentialities which may or may not become actualities. It is like the parable of the Talents. The child comes into the world with one talent, or ten, or fifty. At the time of birth the number and the nature of these has been absolutely fixed. None can be added, none can be taken away; but what is to be done with these talents has not been determined. That is left to be settled by the circumstances of life—by accident, by education, by the will of the individual. A child may be born with the gift of song; he may have it in him to become an artist, a musician, a statesman. But the circumstances of life may draw him at an early age into some arduous business which engrosses his entire attention and absorbs his entire energy. The result is that his talent dies. Again, a child is born of a consumptive parent; he inherits something of that parent's constitution. But must he inevitably die of consumption? By no means. It is true that if he is badly nourished in childhood, and apprenticed to an unhealthy trade, the danger of his doing so is inevitably very great. But attend carefully to his bodily health in his youth, and bring him up to lead a healthy outdoor life, and the probability is that he will live to a green old age.

(*b*) *The Inheritance of Acquired Characters.*—That characters acquired by an individual in the course of his lifetime may be handed on to his offspring is one of those ideas which are so in accord with common sense that they only require to be stated to find acceptance. This particular statement is not only in accordance with common sense, but, one might say, with the facts of daily observation. We all know of instances where the children of people who have devoted themselves to art or literature are possessed of talents in the same direction. We expect the son of the blacksmith to have better muscles than the son of the clerk, and our expectation is usually justified. Examples need not be multiplied. They abound on every side.

And yet, in the face of such facts, a considerable majority of biologists at the present day reject altogether the doctrine of the inheritance of acquired characters. The matter seems worth inquiring into.

To follow the argument it is necessary to understand clearly what an acquired character is. The term 'acquired' is used in a somewhat specialized sense. By an acquired character the biologist means one which results from use or disuse, or from accidental circumstances such as injury or disease. If this definition is accepted, it will not be open to us to argue that every character must have been acquired some time, and that, therefore, every character which is transmitted from parent to offspring is an example of the inheritance of an acquired character. On the contrary, many characters which appear in the course of the individual lifetime are not, in the technical sense, acquired characters at all. If, for example, as the result of an attack of scarlet fever, a man loses his hair, his baldness is acquired. But if, at a certain age, his hair falls out without known cause, save advancing years, his baldness is not an acquired character. According to the theory of non-inheritance we should expect the son to become bald at about the same age as his father in the latter case, but not in the former.

It must also be understood that no one denies that acquired characters may *reappear* in successive generations. What is denied is that there is clear proof of their being *inherited*. If this consideration is applied to such examples as I have cited above, it will be found that the argument becomes somewhat elusive. The moment we quote an example of the apparent transmission of an acquired character we are told that the parent could never have acquired the character unless there had been an innate tendency in that direction, and that its reappearance in the next generation proves nothing more than the inheritance of this innate tendency. The musician's son is a first-class musician. Well, this only implies the inheritance of his father's gift, which he might equally well have inherited unimpaired had his father never played a note. But he is a much better musician than his father! Well, think of his upbringing! Born into a musical family, hearing the best music from his babyhood, associating with musical people from his childhood, it is little wonder that he should surpass a father who had no such advantages.

It seems impossible to get round this method of arguing, and if we turn aside to look for instances of acquired characters which have no hereditary basis, we find that they are not numerous. Even diseases imply an inborn susceptibility. Mutilations, and the results of accidents and operations, are the best examples of purely acquired characters, and the evidence furnished by them is entirely against the theory that such characters are transmitted. Certain races of mankind have practised ceremonial mutilations generation after generation for thousands of years. If acquired characters were inherited, we should surely find evidence of it here. But the effect of such long-continued experiments has been absolutely nil.

The evidence derived from the microscopic study of developing germ cells also tells against the doctrine of the inheritance of acquired characters. Huxley described the germ as being 'simply a detached living portion of the substance of a pre-existing living body,' but recent observations force us to abandon this view. It is now claimed that there can be demonstrated a direct continuity of the germ cells from one generation to another. The germ cells of each generation are derived, not from the body cells, but directly from the germ cells of the preceding generation. From the earliest period of development they are set apart to form the sex cells of the individual in whose body they lie. There they are in the body, but not of the body. In the light of these observations it is difficult to conceive how specific acquirements can affect the germ cells in such a way as to secure transmission.

A knowledge of the laws of heredity is not of merely academic interest. It is, indeed, evident that if we are intimately acquainted with the stock of which a child comes, we are in possession of information which should be of practical service in his training. The more widespread any tendency may be in the stock, the more likely it is to reappear in the child. Armed with such foreknowledge, we are in a better position for studying and understanding the child. We can the more readily recognize the first appearance of each proclivity, and lay our plans for its cultivation or repression. At the same time we should remember that children exhibit unexpected variations from the parental stock. We must not, therefore, despair even of the victims of a bad heredity, nor may we safely relax our vigilance, however good the stock of which a child may come.

If we accept, as I think we must, the doctrine that acquired characters are not inherited, we must remember that they may be reacquired in each generation. This doctrine evidently lays a serious burden upon the educator, but at the same time it should inspire him with hope. For it means, on the one hand, that the most watchful care must be given to the nurture in the child of those good qualities which the parents possessed, and, on the other, that the bad habits of a parent, so far as they are acquired, need not prejudice irretrievably the future of his offspring.

What is a Child?

Now let me conclude this chapter by devoting a few lines to the consideration of the question, What is a child, regarded from the biological point of view? The biologist would restate the question in this way: What advantage is it to the human species that its members should pass through a stage of helpless infancy and dependent childhood?

The best answer we have to this question was supplied by Mr. John Fiske many years ago, and is to the effect that childhood has been the predominant factor in the evolution of the noblest human powers.

An animal which receives no care from its parents must be able to look after itself from birth. Such an animal must from birth be dependent on instinct. Even in its mature years it would be guided by intelligence only to a very small extent. At one time all animals were of this kind. Nature devoted herself to fashioning the bodies and elaborating the instincts of her children, but granted them little, if any, intelligence. The dragon of the prince, as large as a house, must have been, from a safe distance, a splendid spectacle, but it had a mere spoonful of brains and must have been a very stupid creature.

It was not until young things began to be looked after by their parents that intelligence really began to count for anything in the struggle for existence. All animals which have any intelligence worth speaking of are born into families. In such cases instinct may still count for much, but it ceases to count for everything. Intelligence gets a chance.

The state of things which made the possession of a little intelligence an advantage instead of a danger tended in the ancestors of man to prolong the period of infancy, and this again—later infants being born before the earlier were self-dependent—resulted in the evolution of family groups with relationships lasting from birth to death. Such family relationships constituted the environment requisite for the development of man's moral nature. 'Without the circumstances of infancy we might have become formidable among animals through sheer force of sharp-wittedness. But except for these circumstances we should never have comprehended the meaning of such phrases as "self-sacrifice" or "devotion." The phenomena of social life would have been omitted from the history of the world, and with them the phenomena of ethics and religion.'[1]

[1] Fiske, *Cosmic Philosophy*, vol. ii., p. 363.

CHAPTER V

THE METHODS OF CHILD-STUDY

'Where there's a will there's a way.'

WHENEVER we enter upon the practical study of any subject, one of the first things to do is to find out what is known about it already. And, seeing that children have been objects of interest for so long a period, it seems natural to inquire how they have been regarded by men of past times, and to what extent and in what way the experience of the past can throw light on the problems of the present.

As it seems to me that we really can get much assistance from the study of history and literature, I may, perhaps, be permitted to dignify such researches as constituting—

THE HISTORICAL AND LITERARY METHOD OF CHILD-STUDY.

History and literature help us in three principal ways.

In the first place, we may find many hints as to the characteristics of childhood in the history of primitive peoples. Homer's heroes, for example, as Earl Barnes has pointed out, are moved by the same motives and attracted by the same kinds of interests as the children of to-day. Even in much later history, if the Cyropædia, for example, be history, we are often doubtful whether the generals and soldiers we read of are not simply schoolboys after all.

In the second place, the study of various social phenomena may help us. Among all peoples we find customs, and rites, and forms, and ceremonies, and symbols, which serve the purpose of welding the individual life of the children and young people close to the larger life of the tribe; and if we study these things broadly and sympathetically until we understand what they were capable of effecting and actually did effect, we shall through them gain some insight into the primitive minds to which they made their appeal. This, again, will help us to a better understanding of the intense delight taken by children in all forms of ceremonial and of dramatic representation, and to a better appreciation of the value of such things as methods of education. They are examples of those lowly doors spoken of by the poet whereby truth, or what is taken to be truth, enters into the mind of the child. For—

> 'Truth in closest words shall fail,
> When truth embodied in a tale
> Shall enter in at lowly doors.'

In the third place, we may seek for direct reference to childhood. The study of *all* history and literature, of legend, and folk-lore, and tradition, so far as these may help us to understand how men have thought of children, falls under this head. In ancient literatures we shall find sufficient proof that the vision of happy, careless childhood is no new discovery of to-day. In all ages and among all peoples we find the same laughter and singing, the same dancing and shouting, the same gay thoughtlessness and happy indifference. Homer, looking to childhood for some simile, calls up the image of the mother brushing the fly from her sleeping infant; or of the tearful two-year-old plucking at her mother's gown till she yields to the child's persistency and takes her up and comforts her. He tells us of the little Astyanax shrinking back, crying, in his nurse's arms, frightened at his father's waving plumes; of the boy building castles on the sand and razing them again with hands and feet; of the crafty Ulysses, himself a child in the garden at Ithaca, delighted with the gift of a few trees to call his very own.

And so it is wherever we turn, whether to Greek, or Roman, or Hebrew, or to the legends of the further East. Everywhere we find the same thing. The children, who keep this old world fresh and young, are themselves the real conservatives, ever playing in the streets, and dancing in the market-places, acting out their little dramas, and winning the love of those who watch them.

'How far that love differed from ours in these days,' says Mr. Canton, 'it would be difficult to say. In its natural elements it was doubtless identical with our own. Indeed, there is a curiously modern air about the answer of the Greek statesman when, in reply to the question whom he considered the most powerful person in Athens, he pointed to his three-year-old, and said: 'He rules his mother, and his mother rules me.' But it surely lacked the sense of mystery, the spiritual surmises and fore-castings, the feeling of nearness to the unseen world, which with ourselves are such common experiences in our intercourse with the inscrutable new-comers.'

Perhaps so. Certainly we cannot imagine Homer's heroes, themselves but children of a larger growth, having such feelings as Mr. Canton speaks of. What mystery could there be for them in children whose tastes, whose conduct, whose motives of action, were the same as their own? Yet we must beware of imagining that 'no beard grew on any face before the Reformation.' To the Greeks in the time of Pericles Homer's heroes were much what the patriarchs are to us, and perhaps among them that sense of mystery may not have been unfelt. Certainly amongst the Hebrews it must have been strongly experienced as the race grew into consciousness of the Divine guidance. How full of spiritual surmises and forecastings must have been the mind of many a mother as she watched her babe and the promise to Abraham recurred to her, 'In thee shall all nations of the earth be blessed'! Doubtless the mothers, as is their wont, hid all these things in their hearts, until the prophets also began to turn to the child for the fulfilment of their hopes. Zechariah's words of promise to the people that 'they shall live with their children' have been caught up and re-echoed in a later age, and made the motto of the disciples of Froebel, who wrote, 'Come, let us live with our children'; and Isaiah's prophecy of the Golden Age, when 'a little child shall lead them,' has risen to men's minds in all those periods of history when they have seemed to find in the child the promise of a higher future for humanity. I refer especially to the periods of the origin of Christianity, when Christ chose a little child as the symbol of His kingdom; of the Renaissance, when the child became an object of æsthetic interest, and men came to look upon him as the symbol of their ideals; and of our own time, when once again we find a little child in the midst of us, an object of scientific research indeed, but one where the cold light of science cannot conceal the human and ideal interests. Certainly there has never been a time when childhood occupied so large a place in literature as in our own days. In the artistic presentation of childhood in romance and poetry we may find much wisdom; and although it is, of course, true that there is no way of studying children without using our own eyes, I venture to give these methods of which I have been speaking a place here. They really do help us, because—

> 'We're made so, that we love
> First when we see them painted, things we have passed
> Perhaps a hundred times, nor cared to see.'

THE APPROACH TO CHILD-STUDY THROUGH EDUCATIONAL THEORY AND METHODS.

I have already advised some study of education as a preparation for the understanding of children, but I should like to emphasize this mode of approach to child-study a little more.

Educational methods are of two main varieties: The one is based upon the logical arrangement and presentment of the subject to be taught; the other aims at adaptation to the nature of the mind to be educated. The difference between the two may be exemplified by the methods at present in use for teaching foreign languages. In the older, and still prevalent, method the pupil begins by learning the rules of grammar, the conjugation of the verbs, and lists of the irregular verbs with their peculiarities, and goes on to exercises in sentence-making and translating. In the other method, exemplified by the Berlitz and Gouin systems, an endeavour is made to follow the natural method, by which the language is actually acquired as a mother-tongue, the pupil beginning with simple conversation about common objects, building up his vocabulary bit by bit, and leaving formal grammar rules until he has become familiar with examples of their application.

Up to the present time teachers have, on the whole, been content to follow the former method of teaching. Boys have been drilled in Latin and Greek grammar without reference to the manner in which language is actually learned by the child. Arithmetic has been taught without any inquiry as to whether the child really grasped the significance of the figures he was using. The various subjects taught were totally unrelated to each other. At one and the same time a child might be studying the Elizabethan literature, the history of the Plantagenets, and the geography of South America, while considerable progress in Livy and Virgil did not necessarily imply the faintest suspicion that there had been a history of Rome. No doubt the intelligent teacher realized that something was amiss when he found a boy unable to do a proposition in Euclid if the letters were changed; but, on the whole, the average teacher has been very well content to regard his task as the implanting of knowledge rather than the evolving of mind.

Against such a view voices have from time to time been raised in protest, and most of those who have earned fame as educational reformers have done so by recalling men's attention to the fact that, after all, it is mind that matters.

I have already quoted Ascham as a forerunner of the prophets of the new education, which aims, not only at the acquisition of knowledge, but at the complete and harmonious development of all the human powers. Amongst these prophets I may name Comenius, who was the first to treat education in a scientific spirit, and who advocated strongly the education of the senses; Rousseau, who first taught emphatically the doctrine that all education should be based on a study of the being to be educated; Pestalozzi and Froebel, the founders of the kindergarten system; Herbart, whose disciples lay such stress on culture epochs and the circle of thought; and Herbert Spencer, whose classic work on *Education* did so much to awaken the minds of his countrymen to the evils of cramming, to the importance of physical education, and to the educational claims of natural science.

Of these, the most important, from our present point of view, are undoubtedly Pestalozzi and Froebel. To the latter I have already referred; but I would say again that I do not know any way in which one can gain more insight into the development of the child's physical, mental, and moral nature than by an intelligent study of the kindergarten system. Against Froebel it is often urged that he is too mystical for the English temperament, and that his writings are obscure and often unintelligible. Mystical he is, no doubt, but he is also intensely practical; and as to his obscurity, which cannot be denied, the student who finds this too great an obstacle may approach the master through some of his English and American disciples and interpreters, in whom, indeed, Froebel has been singularly fortunate.

THE DIRECT STUDY OF CHILDREN.

The chief feature of the scientific method of study is the careful collection of facts, and the observation of their correlation and sequence. It is only after a large range of facts has been collected, arranged, and classified, that we can formulate those concise descriptions of the observed phenomena which are termed 'laws.' If, therefore, we are to study children scientifically, with the object of discovering the laws of child-nature and development, we must not rely too much on what we find in books. Child-study is essentially a practical subject which is to be pursued, not in the study or the library, but in the nursery, and the schoolroom, and the laboratory—yes, and in the streets, and on the seashore, and in all places where children are wont to play. If we are to study children scientifically, we must come into direct contact with them. We must observe and collect the facts of child-life for ourselves. Whatever help or suggestion we may obtain from books or from other people, it is very necessary that we should learn to see for ourselves; that we should be careful and accurate in our observation of facts; that we should take no theories concerning child-nature and no formulation of the laws of growth and development on authority, but that we should always try to confront these with the facts to see whether or not they are true.

The methods which we shall find useful in investigating child-nature will evidently depend upon what we are trying to find out, and such methods might be classified under headings similar to those of Chapter VI. Very frequently we may have to make use of a number of different methods in a single investigation. In this chapter I shall attempt no classification of methods at all, but shall aim simply at an annotated list of some of the methods of study which have actually been found useful.

(*a*) *Biographical Studies of Individual Children.*—Some of the most useful child-study which has been accomplished has consisted in the careful and methodical observation of a child day after day, with the object of training the course of his development—bodily, mentally, morally, and spiritually. Just think what this means. 'It strikes me dumb,' says Carlyle, 'to look over a long series of faces such as any full church, court-house, London Tavern meeting, or miscellany of men will show them. Some score or two of years ago, all of these were little red-coloured, pulpy infants; each of them capable of being kneaded, baked into any social form you chose; yet see now how they are fixed and hardened—into artisans, artists, clergy, gentry, learned serjeants, unlearned dandies, and can and shall be nothing else henceforth!'

Yes, indeed! to trace the development of one single little red-coloured pulpy infant is a task not to be lightly undertaken. Fortunately several eminent scientific men have carefully studied their own or their neighbours' children and published their observations, and these records help us greatly in observing and studying children for ourselves.

It is interesting to note that Charles Darwin, to whose work modern child-study owes so much of its energy and momentum, was one of the first to point out the need of reliable records of the development of children, and he set a worthy example by studying his own child and publishing some of his records in *Mind* in 1877. Taine,[1] Sigismund,[2] Preyer,[3] Sully,[4] Miss Milicent Shinn,[5] Mrs. W. S. Hall,[6] and Mrs. A. Chamberlain[7] may be mentioned as other contributors to this class of literature. M. Perez, also, who is, I believe, a bachelor, has, in his delightful *First Three Years of Childhood*, recorded his observations on the development of a number of his young friends, and although his book is not strictly biographical, it must be included in this class.

The individual method of investigation has found its chief application in the study of babies, and very few of the studies hitherto published carry us beyond the third year. In the infant human life is at its simplest. The child is under practically constant observation and super-

[1] *Mind*, 1877. [2] *Kind und Welt*, 1897.

[3] *The Mind of the Child*, 2 vols. (International Education Library, Appleton, 1888-89). *Mental Development in the Child, ibid.*, 1893.

[4] *Studies of Childhood*, 1896. 'Baby Linguistics,' *English Illustrated Magazine*, 1885.

[5] *Notes on the Development of a Child* (University of California Studies, 1893).

[6] *Child-Study Monthly*, vol. ii., 1896.

[7] *Pedagogical Seminary*, 1906.

vision. Its surroundings, also, are completely in the hands of the observer.

Many problems of child-life, however, cannot be settled by the examination of single children, and by the time a child is growing, or has grown, out of babyhood its life has become so complex that it is impossible to follow its development with anything like completeness. Hence it becomes necessary to select some more or less definite problem, which, however, we may find it advantageous to pursue in a wider field by studying a number of children. In studying any individual baby, many problems suggest themselves which can only be answered by thus extending the field of observation. Thus, by weighing and measuring an individual child, we can ascertain the rate at which it is growing, but we can tell whether or not that rate is normal only by comparison with standards which are obtained by the—

(*b*) *Anthropometric Methods*, which have for their object the weighing and measuring of numbers of children by accurate instruments. Strength of grasp, sight, acuteness of hearing, and so on, can also be tested, and the characteristic thumb-mark printed. After the Health Exhibition Mr. Francis Galton established at South Kensington an anthropometric laboratory where such observations could be made and registered. This was open to the public, at first for a small fee, and afterwards gratuitously. A large number of data were collected, but the laboratory has now been closed for some years.

Mr. Galton, in his *Inquiries into Human Faculty*, urges the scientific interest and value of such records, and pleads that it should be a family custom for parents to obtain photographs and ordinary measurements periodically of themselves and their families. The prints, he says, should be kept methodically in a family register, along with a chronicle of important events, such as illnesses.

'Those,' he says, 'who care to initiate and carry on a family chronicle illustrated by abundant photographic portraiture will produce a work that they and their children and their descendants in more remote generations will assuredly be grateful for. . . . The life-histories of our relatives are prophetic of our own futures; they are far more instructive to us than those of strangers, far more fitted to encourage and to forewarn us. . . . The child is thrust into existence without his having any voice at all in the matter, and the smallest amend that those who brought him here can make is to furnish him with all the guidance they can, including the complete life-histories of his new progenitors.'

(*c*) *The Experimental Methods.*—This form of study includes such of the ordinary methods of experimental psychology as are applicable to children. The experiments are usually made on a comparatively small number of children, and aim at the elucidation of some very definite problem. Most of the methods in use emanate from Germany, and are so difficult and tedious that Professor James remarks that 'they hardly could have arisen in a country whose natives could be *bored*. Such Germans as Weber, Fechner, Vierordt, and Wundt obviously cannot.'

Only the simpler methods in use are applicable to children, and even then no general description can be attempted. Nor, indeed, would such be interesting or instructive to those who have not already some familiarity with the methods in question.

The kind of observations made may be illustrated by the following: The time of various mental processes; the localization of cutaneous impressions; the influence of suggestion; the measurement of reaction time; the influence of various mental operations in producing fatigue.

(*d*) *The Observation of Children.*—One may study the habits of children very much in the way a naturalist studies the habits of animals. One may watch them coming out of school, and try to form some idea of the amount of energy they seem to have at their disposal after the fatigue of lessons. One may watch them at play in the school-yard or in the streets. One may study various childish propensities, such as imitativeness, destructiveness, combativeness, acquisitiveness, teasing, bullying. An interesting subject for investigation will be found in the games of children. The observer might keep notes from month to month of the games which are ascendant at each season, and the age of the children who play them. The influence of weather on games should be noted, and also the manner in which current events, such as an election or a war, are reflected in the play of children. Even the objectionable habit of scribbling and drawing on walls may furnish a subject for study. An Italian observer has recently published a little book dealing with *The Art of the Child*, which was inspired by the various drawings he found upon the walls of an archway where he had sought shelter from a shower.

An admirable example of this form of child-study is furnished by Stanley Hall's *Story of a Sand-Pile*, which was published long enough ago to be new to most people. It is the story of two boys who were taken to the country for the vacation. A load of sand was brought from the beach for playing with. The boys used this in various ways, especially for building villages and farms. They were joined by other boys, and the play was continued in successive vacations for years.

They made men about two and a half inches high. These they named after farmers and others in the neighbourhood, each boy taking charge of one man and his family. Horses, cattle, waggons, carts, and ploughs were made and gradually improved. Barns were carefully made with lofts, stairs, stalls for horses, and so on. Money was punched out of felt in dollar and half-dollar pieces. Each boy started with ninety dollars.

This play gave the boys great practice in woodwork. It greatly quickened the spirit of active and even prying observation. The boys became more companionable, and learned many a lesson in self-control, and developed a spirit of self-help. Industrial processes, institutions, and methods of administration and organization, were appropriated and put into practice. In the opinion of the parents, the sand-pile had about as much yearly educational value as the eight months in school. 'All the power of motive arising from a large circle of interest is here turned on to the smallest part. Had the elements of all the subjects involved in the sand-pile—industrial, administrative, moral, geographical, mathematical, etc.—been taught separately as mere school exercises, the result would have been worry, waste, chaos. Here is perfect mental sanity and unity, but with more variety than in the most heterogeneous and soul disintegrating school curriculum.'

(*e*) *Direct Questions.*—Some interesting studies have been made by questioning children with a special object in view. Binet studied the ability of young children to recognize representations by this method. He found that a little girl at one year and nine months could recognize outline drawings of common objects, such as a table, a chair, a bottle, but not of isolated parts of the body, such as an eye or a mouth. Even at four and a quarter she hesitated before such pictures. He thinks that this indicates a lack of the power of analysis. He also studied ability to recognize the expression of emotion, using Darwin's plates. Laughter and tears alone were interpreted with certainty.

One of the most interesting studies made by the method of questioning children directly and individually was that which Dr. Stanley Hall undertook with the object of ascertaining what amount of knowledge of common things was possessed by children entering the primary schools. For this purpose he questioned a number of children about such objects as are usually spoken of in the lesson-books used in infant classes. The average age of the children questioned was about six years. A few items may be quoted from Hall's report.

Of the children questioned, 14 per cent. had never seen the stars, and had no idea of them; 35 per cent. had never been into the country; 20 per cent. did not know that milk came from cows; 13 per cent. to 15 per cent. did not know green, blue, and yellow by name; 47 per cent. had never seen a pig; 60 per cent. had never seen a robin; 13 per cent. to 18 per cent. did not know where their cheek, forehead, and throat were; and fewer still their elbow, wrist, and ribs; more than three-fourths had never seen any of the common cereals or vegetables growing; 18 per cent. imagined that a cow was no bigger than its picture.

It is obvious how very important to teachers of young children a study of this kind is. Even the simplest lessons must entirely fail to come home when the children, or many of them, have not the least conception of the things the lesson refers to. Evidently, as the report tells us, it is not safe to assume any knowledge whatever, for school purposes, on the part of the children.

(*f*) *The Syllabus, or Questionnaire.*—This method was largely made use of in their studies by Charles Darwin and by Francis Galton. Mr. Galton's studies on Mental

Imagery, on Number Forms, and on Twins, are amongst the most interesting and valuable investigations made by this means.

The general application of this method to the study of children is due very largely to the energy and enthusiasm of Dr. G. Stanley Hall, to whose suggestion may be traced a large proportion of the studies which have been made in recent years.

Professor Earl Barnes, also, has devoted himself very enthusiastically to this method of investigation, first in America and afterwards in England. His two volumes of *Studies in Education* contain a large number of very interesting and valuable papers which illustrate the wide range which such researches can cover. In the second volume he has printed a series of papers on *Children's Ideals*, illustrating and explaining very fully the manner in which work of this kind should be carried out.

Mr. Galton's investigation of *mental imagery* was carried out upon adults, but the results he obtained have an important bearing upon children, inasmuch as they indicate very clearly the existence of extraordinary differences in minds—differences which certainly date from childhood, being, in fact, congenital. They are, moreover, very suggestive from the educational point of view.

Mr. Galton's inquiry[1] took the form of submitting a number of printed questions to a large number of persons. The first group of questions related to the illumination, definition, and colouring of the mental image, and was framed thus:

'Before addressing yourself to any of the questions on the opposite page, think of some definite object—suppose it is your breakfast-table as you sat down to it this morn-

[1] *Inquiries into Human Faculty.*

ing—and consider carefully the picture that rises in your mind's eye.

'1. *Illumination.*—Is the image dim or fairly clear? Is its brightness comparable to that of the actual scene?

'2. *Definition.*—Are all the objects pretty well defined at the same time, or is the place of sharpest definition at any one moment more contracted than it is in a real scene?

'3. *Colouring.*—Are the colours of the china, of the toast, bread-crust, mustard, meat, parsley, or whatever may have been on the table, quite distinct and natural?'

Mr. Galton tells us that the earliest results of his inquiry amazed him. He had begun by questioning friends in the scientific world, as more likely than others to be able to give accurate answers to his questions. To his astonishment he found that most of those he had addressed protested that mental imagery was unknown to them; that it was only by a figure of speech that they could describe their recollection of a scene as a 'mental image' seen with the 'mind's eye.' On the other hand, among the general public he found many men, more women, and many girls and boys, who declared that they habitually saw mental imagery, and that it was perfectly distinct to them and full of colour. When he cross-questioned them, professing himself incredulous, they were obviously surprised at his apparent hesitation in accepting what they said. A considerable number of persons speak of their mental imagery as perfectly clear and bright, and some add that they would be able to draw from it. Some speakers can see quite clearly the mental image of their manuscript speech, and men who play a number of simultaneous games of chess blindfold must be able to form a very clear mental picture of the boards.

The power of forming mental images is hereditary, and is capable of cultivation by practice. It is evident that it is a power of considerable practical utility. It must, for example, be extremely useful to workmen to be able to visualize what they intend doing before taking their tools in their hands; to artists, to be able to arrange the figures, etc., in a painting before drawing a line; to inventors, to be able to picture to themselves their machines and to see how they work. Besides the utility of the visualizing faculty, its use is attended by great pleasure. A good visualizer may have great delight in recalling beautiful scenery and works of art. 'Our bookish and wordy education tends to repress this valuable gift of Nature. A faculty that is of importance in all technical and artistic occupations, that gives accuracy to our perceptions, and justness to our generalizations, is starved by lazy disuse, instead of being cultivated judiciously in such a way as will, on the whole, bring the best return. I believe that a serious study of the best method of developing and utilizing this faculty, without prejudice to the practice of abstract thought in symbols, is one of the many pressing desiderata in the yet unformed science of education.'

When the desirability of cultivating this faculty is recognized, there will be little difficulty in devising simple means of doing so.[1] If young children, for example, are questioned about what they have seen in their walks, there can be little doubt that they will exercise any power of calling up mental images which they possess. The questions at first might be very simple and general, becoming more detailed as the child's power increased. If the child is encouraged to talk about what he has seen, suitable questions will suggest themselves. Walking quickly past a shop window, and then trying to recall

[1] Ellen Bliss Talbot, 'An Attempt to Train the Visual Memory,' *American Journal of Psychology*, vol. viii.

as many as possible of the articles seen, and their positions in the window, is an old-fashioned way of exercising the visualizing power. Pictures might also be shown to children for a limited time, and then younger children could be questioned about them, while older ones could be asked to write a description from memory. Drawing maps from memory would also constitute a good form of exercise.

One word of caution may be called for. It is well known that young children have often a good deal of difficulty is distinguishing between dreams and reality. Things which have happened in dreams may be spoken of as if they had really occurred, and a child who has been frightened in a dream may subsequently be afraid to go into the room alone. So also in mental imagery things may appear in relationships which they never really occupied, or purely imaginary images may mingle with the images of things seen. The result is that young children will often give circumstantial accounts of their having witnessed events which they never really saw at all. A little girl I know had one day been listening to her elders discussing an accident wherein a man was run over and killed at a level crossing. The next day she was out with her nurse, and saw a train come along the line. After coming home she described to her mother the things she had seen, and was greatly excited when she came to speak of the railway, describing how she had seen the lines, and how the train came along ever so quick, and there was a poor man on the line, and the train ran over him and killed him dead! Here it was evident enough that the child was confusing the impression made on her mind by the story overheard the day before with the image of the railroad she had actually seen; but in many cases it might not be so easy to detect the confusion. Hence it seems desirable that when encouraging young children to call up mental images one should be in a position to check the accuracy of their statements.

The framing of a syllabus is a very difficult matter. In carrying out a study of this kind the necessary steps are as follows:

1. Find some definite problem which is worth studying, and which is capable of being followed out by this method.
2. Formulate a series of questions which are not likely to be misunderstood, which admit of easy reply by the persons addressed, and which cover the ground of inquiry.
3. Gather the data from a sufficient number of persons. In the case of school children it is important to get sufficient replies from children of each age and sex. The age and sex of each child should be marked on the papers.
4. Analyse the data obtained, and arrange the results in groups.
5. From the grouping so obtained draw the generalizations which the facts seem to warrant, and note the bearing of these on educational practice.

This method promises to be of great value in working out the general laws of child-life and furnishing a background for the individual studies. It must, however, be admitted that the over-enthusiasm of a number of workers, especially in America, has led to the issue of syllabi and the publication of results which are of little or no value from the scientific point of view. Many start with no definite object in view, and not unnaturally arrive nowhere. Others may have a more or less definite object, but fail to provide a test which really covers the inquiry.

Many succeed after much toil and trouble in obtaining results which were sufficiently obvious before the inquiry was made.

The tyro in this method of investigation would do well to begin by using some of the syllabi which have already led to fruitful results. By so doing practice in the method will be obtained, and many of the attendant difficulties will be avoided. Moreover, quite a number of the investigations which have been made are well worth repeating, in order to ascertain what differences can be discovered between different classes of children. Professor Earl Barnes has recently been working in England with syllabi he had used in America, and he finds that his results show interesting differences between the English and the American children.

Some examples of this method of child-study will be found in the chapter dealing with interests. In the meantime I shall simply give a few instances of suitable topics with tests of a simple kind.

SUGGESTIONS FOR WORK ON THE LINES OF A SYLLABUS.

Observing Powers.

Give each child a penny stamp with this request: 'Write an account of this postage-stamp, so that a person who had never seen it would know all about it.' Suggested by Will S. Monroe (*Paidologist*, vol. i., No. 1, 1899, *q.v.* for details of classification of replies, etc.).

Memory Types.

Tests.

(*a*) *First Auditory.*—Pronounce these words to the children: (1) Stove, (2) bird, (3) match, (4) hill, (5) knife, (6) boy,

(7) stone, (8) coat, (9) gun, (10) bread. Pronounce a word distinctly every three seconds in the order given. One minute after you have finished, ask the children to reproduce the words in the order given.

(*b*) *Second Auditory.*—Twenty-four hours later ask the children to reproduce the list in the order given. Have no discussion of the words pronounced the preceding day.

(*c*) *First Visual.*—These words to be successively exposed: (1) Tree, (2) lamp, (3) fish, (4) coat, (5) man, (6) book, (7) road, (8) pen, (9) door, (10) meat. Write on the blackboard, and expose one word at a time for three seconds (erasing the exposed word before writing the next). One minute after the last word has been erased, ask the children to reproduce the words in the order exposed.

(*d*) *Second Visual.*—Twenty-four hours later ask the children to reproduce the words exposed the preceding day, and in the same order. Suggested by W. S. Monroe (*Paidologist*, vol. ii., No. 1, 1900).

VISUAL IMAGERY.

Tests.

First.—Show the children ten familiar objects one after the other, exposing each for three seconds. One minute after the last has been put away ask the children to write down the names of the objects in the order in which they had been shown.

Second.—Twenty-four hours later ask the children to write down the names of the objects shown the preceding day, in the same order.

Third.— Place ten common objects on a tray and cover them up. Have the children sitting so that they can see well. Expose the objects for half a minute (or one minute). After covering them up again, ask the children to write down what they had seen.

Fourth.—Show the children a picture—preferably a large coloured picture containing some striking incidents. After the children have looked at the picture for thirty seconds put it away. Ask the children to write a composition exercise describing the picture as fully as they can.

Suggestibility.

Show the children (better one child at a time) lines of the following length drawn upon a piece of paper: 2, 2½, 3, 3½, 4, 4, 4, 4, 4 inches. Show one line at a time, and immediately after the child has seen it ask him to draw on a piece of paper a line of the same length. Note whether the gradual increase in length of the earlier lines causes him to continue to add successive increments after the lines exhibited have ceased to increase.

Money Sense.

Ask the children to write a composition on: 'If you had sixpence a week to do with as you liked, what would you do with it?' Discriminate under the following heads: Pleasure, dress, presents, education, useful articles, books and pictures, philanthropy, indeterminate saving. For papers showing the results of this test see *Paidologist*, vol. iii., p. 12, 1901; *ibid.*, vol. vi., p. 6, 1904.

Vocation.

Compositions on such a question as 'What do you wish to be when you are grown up? Why?' See Earl Barnes' *Studies in Education*, vol. i., 1896. A report published by the London Board of Trade, entitled *Elementary Schools: Children Working for Wages*, Part II. (Spottiswoode, 1899, price 6d.), shows the occupations actually taken up by children who left the London schools in 1893-1894.

Ideals.

Compositions on the question, 'What person of whom you have heard or read would you most like to resemble? Why?' See p. 286. See also a series of papers on this subject in Earl Barnes' *Studies in Education*, vol. ii. (Philadelphia, 1902). These papers illustrate and explain very fully the methods of carrying out a statistical study of this kind.

Reasoning Powers.

The Cheltenham branch of the British Child-Study Association issued the following questions to teachers in colleges, public schools, preparatory schools, and primary schools of different grades:

(a) Children from Seven to Ten Years of Age.

1. One boy met another, and noticed that his eyes were red. He said, 'You've been crying.' Do you think he was right? Why?

2. All cold can be driven out by heat. John Thomas has a cold, so he can be cured by sitting by the fire. Do you agree? Give a reason.

(b) Children from Ten to Twelve Years of Age.

1. Same as (*a*) 2.

2. There are several clever boys in this class, and they are all careless. So a clever boy must be careless. Do you agree with this? Give your reason.

(c) Children from Twelve to Fifteen Years of Age.

1. Same as (*b*) 2.

2. French people are excitable; so are Italians; so all foreigners are excitable. Is this true?

For the results of this study see a paper by Rev. C. H. King in the *Paidologist*, vol. v., p. 157, 1903. The chief conclusions reached are as follows: (1) That intellectual bias—power—crops up in a most decided manner, irrespective of education and special training. (2) That a considerable proportion of those who have received a good education and have reached the age of fifteen years fail to show anything but the germs of thinking of a logical kind. (3) That education improves this faculty, grammatical and mathematical studies telling their tale. (4) That it would be a severer but more satisfactory test to give fallacies which were further removed from the experiences of pupils than those which were given in this instance.

Power of Inference.

Mrs. Barnes' test: 'If you were shipwrecked on a desert island, and found an old house, and part of a boat with broken arrows in it, what would these show you?' Mrs. Barnes finds that the number of inferences rises rapidly at twelve for boys, at thirteen for girls. The inferences are chiefly imaginative. On the critical side, the power is rare, but, when present, clear and strong from the age of thirteen upwards.—*Studies in Education*, vol. i.

Sense of Evidence.

'Write down something that happened before you were born, and tell me how you know it is true.'—*Studies in Education*, vol. i.: 'Historic Sense of Children.'

Ideas of Justice.

The following story was used as a test by Miss Darrah: 'Two burglars broke into a house and stole some money. One escaped, and could not be found. The other was caught. The regular punishment for such a burglary was five years in prison. What would you have done with the burglar who was caught?'—Earl Barnes' *Studies*.

A story which comes closer to the child's own experience is one used in different forms by Professor Barnes. It is of a child who received a present of a box of paints. One day she painted the chairs in the parlour, and then called her mother to see how beautiful they were. But the paint would not wash off, and the chairs were spoiled. The children were asked to say what they would have done if they had been the child's mother.—See *Studies*.

CHAPTER VI

HOW TO STUDY A BABY

'Who can tell what a baby thinks?
Who can follow the gossamer links
By which the manikin feels his way
Out from the shore of the great unknown,
Blind, and wailing, and alone,
Into the light of day?'

THOSE who have never studied a child may think it must be a comparatively easy thing for anyone who has some leisure and a little perseverance simply to set down from day to day in diary form the points noted in a child's development. But in practice notes made in this way without previous preparation are likely to be of little value. Innumerable points of interest will be missed unless one knows beforehand what to be on the look out for. The infant will be found in the full possession of faculties whose dawn has passed unrecognized. The full joy of various infant accomplishments will be his without the observer having any notes to show how they have been acquired. The careful, systematic study of an infant is not an easy thing, but it has been made much easier by the admirable works which I have mentioned on p. 77. To these, and to a very valuable syllabus of child-study published a few years ago by Holman and Langdon-

Down, I have been much indebted while preparing the present chapter.[1]

As regards the actual keeping of the record, various plans may be adopted, but there are two cardinal rules which the observer should adhere to strictly: The first rule is that the notes should be kept systematically, and the points observed noted down immediately or as soon as possible afterwards. Notes made at once are far more likely to be accurate than any made after even a short interval. There are very few of us whose memory is nearly as accurate as we suppose it to be. The fact that the lapse of even a few hours may bias our testimony is recognized by the law of England, which allows a witness to refer in court to notes which he made at the time of the event about which he is giving evidence, but will not allow him to refer to notes which he made subsequently. In observing children it is not, of course, always possible to make our notes literally at the time, but they should be made at the earliest opportunity; and if any notes are inserted referring to the past, this should be distinctly stated. The second rule to be followed is that a careful distinction should be made between what is observed by oneself and what is simply reported by another. As far as possible the observations should be first-hand, but it cannot but happen that various points observed have been previously seen by others. When this is the case, the notes should record who the observer is. For instance, it might be noted that on such a date the child first stretched out its hand with obvious desire for some object, but that the nurse reported having seen the same movement about a week earlier.

[1] H. Holman and R. Langdon-Down, *Practical Child-Study: The Baby, how to Observe, Understand, and Train Him* (the *Surrey Comet* Office, Kingston-on-Thames, 1899).

The notes may be kept in diary form, in which case it will be well to follow a certain order from day to day. For example, one might first make notes on the bodily movements, then on the senses in regular order, then on points bearing on mental development. If the notes are likely to be at all copious, however, it will be found more convenient to have a large note-book divided into sections dealing with the various subjects of observation. The convenience of this method is not so much in the making of the record as in the ease of reference when the notes dealing with special phases of development are to be brought together. The notes should be made on one side of the paper, and it will be of interest to place on the opposite page references to similar observations in the published records. The card-catalogue system of keeping a series of classified notes might also be found convenient.

SYLLABUS.

PRELIMINARY.

A. Ancestry. — Nationality, physical development, temperament, health and longevity, occupation, education, etc., of parents, grandparents, and other relations.

B. Environment.—Birthplace of child; date of birth; general surroundings—town, country, indoor, outdoor; social surroundings.

PHYSICAL DEVELOPMENT.

A. Measurements.—Weight, height, girth, etc. (see Chapter VII.); dates of eruption of teeth.

B. Movements.—Carefully note, describe, and classify the movements of the child. The following is Preyer's classification :

1. *Spontaneous (Impulsive) Movements.*—These movements are most abundant in the early weeks of life. They are not of a purposive or expressive character, nor do they seem to result from stimuli coming from without. Note, however, how frequently they resemble reflex or voluntary movements.

Note the not infrequent occurrence of movements similar to these when the baby is interested or excited, or when it is listening to some sound or gratified by some sight. Such movements Preyer calls 'accompanying.' They approximate to the next class.

2. *Reflex Movements.*—These are called forth by some peripheral sensation. Note the occurrence of swallowing, sneezing, coughing, choking, starting, winking, yawning, hiccoughing. What effect is produced by sudden sounds? At what date can winking first be induced? What effects result from gentle stroking of various parts of the body?

3. *Instinctive Movements.*—Note how these shade off into the simple reflex movements at one end and into the ideational movements at the other. Thus, sucking, licking, biting, smacking, chewing, groping, and seizing with the lips, pulling against resistance, are purely instinctive movements, which resemble reflexes; while such movements as holding up the head, sitting up, pulling the body up into the sitting posture, standing, creeping, walking, running, climbing, grasping, are based upon strong instinctive impulses, but are developed and perfected by effort.

4. *Ideational Movements.*—These may be divided into imitative (make-believe plays, etc.), expressive (kissing, cuddling, clapping hands, etc.), and deliberative movements. Naturally, they do not make their appearance so early as the first three groups, as they presuppose some progress in mental development.

Note carefully the date of the development of the various instinctive movements. Miss Shinn gives the following table of the extreme dates recorded:

Extreme Dates of Acquiring Instinctive Movements.

Movement.	Earliest Date Recorded.	Latest Date Recorded.
Holding head:		
1st effort	1st day, *Wood; Talbot Papers*, Case E, two children	11th week, *Preyer.*
Habit	11th week, *Shinn*	24 weeks, *Demme.*
Sitting:		
1st effort	10th week, *Wood*	18th week, *Hall.*
Habit	26th week, *Wood; Shinn*	11 months, *Demme.*
Standing:		
1st effort	18th week, *Sigismund*	14th month, *Preyer.*[1]
Several minutes alone	40th week, *Demme*	70th week, *Preyer.*
Walking:		
1st movements	19th week, *Champneys*	41st week, *Preyer.*
Free walking alone	8 months, *Sigismund*	24th month, *Demme.*

Keep a record of the development of special movements:

(*a*) Grasping—*Reflex Clasping.*—Note the early tendency of the hand to close tightly on objects placed against the palm. How soon after birth is this reflex present? Does it increase or diminish on succeeding days?

Carrying to the Mouth.—Note also the tendency of the hands to move upwards, accidentally getting into the mouth. When do you first notice a definite tendency for the hands to carry to the mouth objects clasped? When do deliberate attempts to carry objects to the mouth first appear, and during what months is this tendency dominant?

Grasping with Desire.—Note the early fumbling about for objects to grasp. When is the first attempt to grasp by visual guidance?

Note periodically the increase in *skill* in grasping, also

[1] Not his own observation; reported from 'trustworthy parents.'

the growth in *interest*, the baby reaching for everything.

Note also any tendency to sudden snatching; accuracy or inaccuracy of aim; ability to gauge distance.

When do the finger-tips begin to be differentiated for delicate investigation? When is the forefinger first used for pointing? Is the right or the left hand preferred? Does the habit change from time to time?

(*b*) EQUILIBRIUM AND LOCOMOTION—*Holding up Head.*—Note the early occasional stiffening of the neck. When does the head begin to be voluntarily raised? When does the baby begin to turn the head about in order to see things?

Sitting.—When does liking for the upright position become apparent? When does the infant begin to straighten the back to make it support part of the weight?

Note progress of effort to rise to the sitting posture. Test whether the child will try to pull itself up by your hands if given to him.

Note early occasions on which the child succeeds in raising itself to the sitting posture. How is the act accomplished? How long can the child sit steadily, and with how much support?

Rolling.—When does the child first turn from back to side? To face? Is rolling ever used as a means of locomotion? If so, how long is it persisted in? Is there any rule as to the direction of rolling—from left to right or from right to left?

Creeping.—When is the first desire for locomotion noticed? Test by placing the child on the floor with attractive objects a little out of reach. Note the progress to successful creeping. How is creeping accomplished—hands and knees, or hands and feet? Does the child creep for the pleasure of movement, or only to get to some object of desire?

Hitching.—If this habit develops, keep a record of it similar to that for creeping.

Standing.—Watch for the appearance of desire to stand; for efforts to pull the body to the erect position from all-fours. Are such efforts discouraged by falls? When can the child stand supported by only one hand? When unsupported?

Walking.—Note the first tendency of the child held supported to press the feet against a firm substance. Is there any tendency to alternate movement of the legs much in advance of real efforts to walk? Note the progress of different modes of walking—edging along by the wall, pushing a chair in front, etc.—till walking seems fairly acquired. Note the distances traversed. Does *running* precede or follow walking?

Climbing.—Is a marked inclination to climb ever a trait in the child's development? When is it dominant? Describe the manner of climbing upstairs; downstairs.

Jumping (dancing up and down, jumping off steps, etc.). —When does jumping become a pleasure? Does it develop spontaneously, or in imitation or emulation of other children?

MENTAL DEVELOPMENT.

A. Senses.

Sight—*Perception of Light.*—During the first few days of life note the baby's sensitiveness to light—*e.g.*, frowning or screwing up the eyes in presence of a strong light.

Fixation of the Eyes upon Objects.—Note when the eyes lose their aimless look and appear to rest upon objects. Make a note of instances in which the gaze remains fixed for any length of time upon a definite object. When do objects stared at cause pleasure or excitement, and for how long a period will an interesting object continue to hold the attention?

Attraction of the Gaze by Objects in Motion.—When can the infant first follow a moving candle with its eyes? When the first non-luminous object? Note instances in which the child spontaneously follows moving objects?

Recognition of Form.—When does the baby first seem to recognize visual objects? When does he begin to recognize the faces of relatives, or to be puzzled by or afraid of strange faces? Look out for instances of confusion of plane and solid form. At what age is spontaneous notice taken of pictures on the wall or in books? When are familiar objects recognized in pictures? Keep notes of the growth of interest in seeing.

When some progress has been made in recognizing objects, note the longest distance at which they are recognized. Note also mistakes in recognition at a distance.

Colour.—During the *first few weeks* note instances in which the gaze is strongly attracted by coloured objects, or in which such objects excite demonstrations of interest or pleasure, or, again, in which they cause distraction of the attention, for example, leading the child to cease nursing until they are put out of sight.

Professor Barnes suggests the following test, which may be repeated at intervals during the first few months. Hold two sheets of paper or other material, alike in all respects but colour, close together before the child, so that he sees them both at the same time; then move them apart so slowly that he can follow them with his eyes, and note which is followed. Reverse the positions and repeat, to make sure that the direction of the light has no influence, and to see if preference is given to the right or left eye.

At each experiment the test should be repeated a dozen times, with whatever interval may be necessary to secure good conditions in the baby's mood.

After grasping is acquired, one may test with pieces of ribbon or paper selected to match the primary colours. Hold these at a definite distance from the child and note which he reaches for. Take precautions against preference for the right or left hand; also against differences in previous associations in the case of ribbons.

When speech is understood, a number of tests may be introduced. For this purpose it is very useful to have a set of coloured 'blocks' or tablets. The child is shown a red, blue, or yellow block, and asked to pick out those like it. Or one set of blocks may be arranged in order, red, blue, yellow, and the child asked to arrange his in the same way. If it is evident that the child cannot do it, wait for a few weeks and try again. If it can be done perfectly other colours may be successively added. In carrying out such tests it is, of course, necessary to be quite sure that the child understands what he is asked to do. The tests suggested avoid the fallacies involved in asking the child to point out the red, blue, etc., or in asking him, 'What colour is this?' If such questions are asked mistakes may obviously arise, not from any inability to discriminate colours, but from confusing their names. Care must be taken also to avoid questions which suggest their own answers, such as, 'The red is the prettiest, is it not?'

A good test consists in sorting blocks, or scraps of silk, or worsted, according to colour.

HEARING—*Perception of Sounds*.—From the first day look out for instances of starting or winking at sudden sounds. Test with a bell or whistle. At what age is the head first turned towards sounds heard?

Recognition of Sounds.—Keep a record of instances in which the child seems clearly to recognize sounds. Note also attempts to imitate sounds. Record examples of sounds which excite marked pleasure or displeasure When the child can talk, ask, when a sound is heard, 'What is that ?' and 'Where is it ?'

Music.—Pay attention to the following points:

When does the child first pay attention to single notes struck upon the piano?

If the child is fretting, try to what extent music will divert his attention. Compare the comparative influence of slow and lively music.

Note the appearance of any disposition to sing on hearing music.

As early as it seems any use to try, see whether the child will give back correctly a note played on the piano. Repeat the experiment at short intervals and record each result.

Does the child show any evidence of discomfort at a discord?

Note the progress of ability to keep time to music by swaying the body, clapping the hands, or marching.

Has the child any facility in learning easy rhymes and jingles at an early age? Does the rhythm help the memory at all, or does the child tend to sacrifice sound to sense? In imitating singing, does the child reproduce the time of the original?

SENSATION.—Observations may be recorded as to the sensibility of the skin to touch, pain, heat, and cold. The ability to localize a touch or prick should be recorded.

In experimenting, remember that the withdrawal of a limb from a slight touch or prick does not necessarily prove feeling, because the movement may be reflex.

Observe the appearance of interest in the feeling of different objects, the child rubbing the fingers over the surface of articles; also interest in apparent differences of temperature—the coldness of iron, etc.

TASTE.—Taste may be tested by placing on the finger minute quantities of solutions of sweet, bitter, or acid substances, and allowing the child to suck them. Note how each is received. Keep a record, also, of all additions to the child's diet, with an account of how each is received.

SMELL.—Smell may be tested by various scents or volatile oils, but irritating substances, such as ammonia or smelling-salts, must on no account be used.

B. EMOTIONS.

In his work on the *Ascent of Man*, Professor Henry Drummond gives the following list of the emotions:

Fear.	Emulation.	Benevolence.
Surprise.	Pride.	Revenge.
Affection.	Resentment.	Rage.
Pugnacity.	Emotion of the beautiful.	Shame.
Curiosity.	Grief.	Regret.
Jealousy.	Hate.	Deceitfulness.
Anger.	Cruelty.	Emotion of the ludicrous.
Play.		
Sympathy.		

We are told that this list is something more than a mere catalogue. It is an *arranged* catalogue. These emotions not only have appeared in animals, but they appeared in this order. In the child we find the same emotions, and in the mind of the growing child these emotions appear *in the same order as they appear in the animal scale.* 'At three weeks, for instance, Fear is perceptibly manifest in a little child. When it is seven weeks old the Social Affections dawn. At twelve weeks emerges Jealousy, with its companion Anger. Sympathy appears after five months; Pride, Resentment, Love of Ornament, after eight; Shame, Remorse, and Sense of the Ludicrous after fifteen.'

Do your observations confirm Professor Drummond's statement or otherwise? Remember that the dates given are intended as only roughly correct. The important point to observe is the *order* of emotional development.

The special points to be noted with regard to the various emotions may be illustrated in the case of a few of the more important.

PLEASURE.—Keep a list of things which excite marked pleasure. How long do they continue to please? How is pleasure expressed—smiling, chuckling, laughing, shouting, panting, eager stretching of arms, etc.?

FEAR.—On no account try to frighten the child, but keep a list of all things which frighten him—sights, sounds, touch-sensations, the unexpected, fear of falling, of darkness, of being left alone, etc. How is fear shown on each occasion?

Note any things which are received by the baby with indifference, or with interest, but which afterwards occasion fear. Can you account for the development of such fear? Note examples, if possible, of fears outgrown. Have you cured the child of any fear? How?

ANGER.—Note occasions of its appearance, its manner of expression, and any apparent hereditary peculiarity. To what extent is temper controllable? By what means has the child been helped to control his temper?

UNHAPPINESS.—Keep a list of things which cause dislike or unhappiness, and the successive means of expressing the emotions.

SOCIAL AFFECTIONS. — Keep a record of definite examples showing affection, sympathy, compassion. Remember that positive evidence is wanted, not mere opinion, that such emotions exist.

C. WILL.

The development of the will may be studied in the development of the power of voluntary movement. The following table from Professor Preyer will be found useful:

MOVEMENT.	NO TRACE EXISTING.	FIRST ATTEMPTS.	WITH DELIBERATION AND EFFECT.	REMARKS.
Head-shaking	—	4th day	16th week	In refusal.
Holding the head	10th week	11th week	16th week	
Seizing	114th day	117th day	17th week	
Raising the upper part of the body	12th week	16th (?) week	22nd week	Lying on back without help.
Pointing	4th month	8th month	9th month	
Sitting	13th week	14th week	42nd week	Without being held or supported.
Standing	21st week	23rd week	48th week	Wholly without support.
Walking	40th week	41st week	66th week	Alone, freely.
Raising self	13th week	28th week	70th week	Without being held or helped.
Stepping over a threshold	65th week	68th week	70th week	Without support.
Kissing	11th month	12th month	23rd month	
Climbing	24th (?) month	26th month	27th month	Without being held or helped.
Jumping	24th (?) month	27th month	28th month	

Note instances where the child tries to do something a great many times before giving up (test suggested by Professor Baldwin). Count the number of times.

What encouragements will induce him to go on trying after the spontaneous efforts have ceased?

INHIBITION.—Record any instances of the child refraining from doing something he wished to do, as a result of suggestion, from fear of the consequences, or for some other reason.

D. INTELLECT.

Record observations under the following headings:

ATTENTION—(*a*) *Passive Attention.*—Prolonged staring at light surfaces, bright colours, etc.

(*b*) *Active Attention.*—Give examples. Note duration of sustained attention; obliviousness or otherwise to surroundings.

N.B.—When the child's attention is engrossed, avoid disturbing him unnecessarily.

MEMORY.—*Recognition* of faces, bath, toys, etc. Ditto after longer or shorter intervals.

Association.—Of hat or cloak with expectation of going out; of fear with the appearance of something which on another occasion caused pain.

Verbal Memory.—Ability to supply words omitted from familiar rhymes; ability to learn nursery rhymes; memory for names—test by showing the child some unfamiliar object, naming it, and asking the child to name after some days or weeks. Note whether the child talks about it, or asks for it in the interval.

UNDERSTANDING.—As occasion offers, test the child's comprehension of words or phrases heard or used. When the child is at the stage of learning little bits of poetry, beware of an unintelligent, parrot-like repetition of favourite pieces. Note any examples of misunderstanding, or any special difficulties in understanding. See also *Speech.*

IMITATION.—(*a*) Immediate imitation—waving 'bye-bye,' etc., in response to some other person's gesture.

(*b*) Representative imitation—*e.g.*, putting on father's hat, and imitating his walk.

SENSE OF SELF—(*a*) *Interest in Parts of Body.*—Hands, fingers, toes, knees, nails, etc. Later, curiosity as to internal organs—bones, heart, stomach.

(*b*) *Sense of Power.*—Pleasure in making a noise, in tearing paper, etc. Eagerness to do things for himself; to attempt whatever he sees others doing.

(*c*) *Influence of Dress.*—Pride in dress; change of disposition associated with change of dress; rôle of dress —*e.g.*, first trousers—in promoting growth of self-consciousness.

(*d*) *Mirror Image.*—When first noticed; laughed at; grasped at; licked or kissed; grimaced at; real object looked for—behind mirror; in proper place.

(*e*) *Self-Consciousness* on hearing remarks with personal reference; tricks to conceal guilt.

(*f*) *Philosophical Speculating.*—'Where was I before I was born?' 'Do I live, or am I like dolls?' Questions as to God, space, pre-existence, etc.

REASONING.—Note early examples of practical reasoning—*e.g.*, looking for the source of a sound; for the cause of a shadow; for the real object when a reflection is seen.

When does the child first make use of a stick or other instrument to reach for a desired object? When is a stool or chair first fetched by the child, in order to climb up to a shelf or table?

When does the child begin to ask why? Note examples of the drawing of inferences, both valid and invalid; examples of the confusing of cause and effect—*e.g.*, the belief of some children that the waving of the trees causes the wind.

E. SPEECH.

1. FIRST YEAR.—From the first, record the various vowels and consonants as they appear. In what order do the vowels appear? Which are the first consonants to

be used? When are spontaneous reduplications first uttered—'ba-ba,' etc.?

How early can you detect differences expressive of hunger, pain, discomfort, wetness, pleasure, anger, surprise?

When does the baby begin to recognize objects by name? Test by asking where is the clock, the pussy, the dolly, etc., taking great care to give no hint by looking at or towards the object spoken of. Repeat the test frequently at intervals to make sure that the words are really understood.

Keep a list of words and names obviously understood until the number becomes too great.

2. SECOND YEAR.—If possible, note the child's vocabulary at 12, 15, 18, 24, 30, and 36 months.

Note the variety of meaning attached by the child to many of the early words used.

Note the use of single words with more or less gesture to express an entire sentence.

Keep a list of all early combinations of words in phrases and sentences, and note the gradual advance in ability to construct sentences.

Does the child at any time evidence unwillingness to use speech if a gesture will serve the purpose? Does pretended inability to understand his gestures encourage the use of speech?

Note any words which appear to be invented, or to be distortions of words heard.

How is the progress of speech affected by teething, learning to walk, rapid physical growth, illness?

Have you noticed any special difficulties in pronunciation—lulling, lisping, stammering, etc.? Have you been able to help the child over such difficulties? How?

CHAPTER VII

WEIGHTS AND MEASURES

'A physical fact is as sacred as a moral principle.'

AGASSIZ.

PERHAPS no investigation of children is more easily carried out than the ascertaining and recording of height and weight. Healthy children grow steadily, but not quite uniformly, in both height and weight. But growth in height and growth in weight do not mean quite the same thing. The height of the human body depends almost entirely on the bones composing the skeleton. The weight of the body depends also upon the soft parts.

Now if anything interferes with nutrition during the early years of life all the parts of the body will be affected, and the child will be below the average both in height and in weight. But if after some years of normal growth there occurs some temporary interference with nutrition, the child will lose weight, but there will be no loss of height. Consequently, we shall find not only that the weight is below what it should be at the child's age, but that it is too little relatively to the child's height. In each of these cases, then, we have to deal with a problem of nutrition, but the problem obviously differs in the two cases.

In all civilized countries measurements have been made of large numbers of children, and tables have been drawn up showing the average heights and weights at the various ages. These tables constitute the standards with which the measurements of a given child are to be compared. But when we study these standards we are at once struck by the fact that they do not agree with one another. The standard differs in different countries. The average German child of a given age differs from the average English child of the same age. Even in one country different classes of children follow different standards of growth. In the United States negro children differ from white children, and white children of European parentage differ from white children whose ancestors have resided in America for several generations. Moreover, in a given race the children of small parents differ from those of tall parents. The growth-impulse in a child is derived primarily from the parents, secondarily from the race. Heredity is a factor of paramount importance in the study of growth. In drawing up our standard tables we must take this into account. Particular children must be compared, not with children in general, or not with them only, but with a standard based upon the examination of children of the same class.

Heredity is not the only factor in growth. Nurture as well as nature has to be taken into account. The children of the Board schools differ from those of the great public schools. The children of Board schools in healthy localities, attended by children of the upper working classes, differ from those of schools in the slums of large towns, attended by the children of the lowest social standing. Under the title 'nurture' we include what a biologist would describe as environmental influences—tioil those conditions which are not hereditary, but which able tact with the hereditary factors in the process of pment. We include the feeding, the clothing, the housing of the child, the atmosphere he breathes, the conditions amidst which he lives within and without his home, the care with which he is tended by those responsible for him, and the illnesses from which he suffers from time to time. These, and more, play their part in the story of growth, and in the study of a child one has to differentiate between such factors as are common to children of the same class and such as are special to the individual.

It is sufficiently obvious that a child who does not get sufficient food cannot undergo normal growth. It is less obvious, but also true, that a child who does get sufficient food may still get insufficient nourishment. This may result from the food being unsuitable in quality, although sufficient in quantity, as when an infant is fed upon 'whatever is going' at its parents' table. Or it may result from some fault in the child's assimilative powers. The food supplied may be sufficient in quantity and good in quality, and yet the child may be poorly nourished, perhaps from some fault in the environment, such as bad ventilation at home, or perhaps from damage done to the digestive powers by improper feeding at an earlier age. To what extent poor nutrition at an early age affects growth later on, if the conditions of existence then become satisfactory, is doubtful. One certainly sees many children who, through no fault of theirs, squander many months of their babyhood by wasting away to skin and bone, and who yet, under more judicious management, recover to a marvellous degree, and are stout and lusty youngsters enough at two or three years of age. But in spite of the young child's wonderful powers of recuperation, it seems scarcely likely that such evil days can fail to throw their shadow over all the future, and there are those who maintain that if nutrition in early childhood is bad the full stature is never attained. Much, doubtless, depends upon the degree to which the child suffers, much upon the age of the child at the time, and much also upon the duration of the period during which the retarding influence is at work.

WEIGHT.

At birth the child's weight varies very considerably, but the average may be taken as a little over 7 pounds. For a few days after birth there is a marked loss of weight, amounting to some 9 or 10 ounces altogether. After this there should be a steady daily increase in weight, the initial loss being regained by the ninth or tenth day. At the age of six months the average infant weighs nearly twice, and at one year nearly three times, as much as at birth.

Of the weight of children from the second to the sixth year we have comparatively few observations, most of the investigations which have hitherto been made having been confined to school-children. Fuller observations of these early years are much wanted to throw light on the relationship between malnutrition during school-life and the state of health and nutrition before school attendance begins. Holt gives the average gain in weight as 6 pounds during the second year, about 4½ pounds during the third, and about 4 pounds during the fourth. The weights of older children are shown in the table on the opposite page.

HEIGHT.

The average child measures about 20 inches at birth, and gains about 8 inches during the first year, about 3½ inches during the second year, and afterwards about 2 or 3 inches yearly. Growth is never quite uniform. There is a seasonal periodicity in which the most rapid growth in height is associated with the least growth

AVERAGE HEIGHT (WITHOUT SHOES) AND WEIGHT AT DIFFERENT AGES.

BOYS—HEAVY TYPE. GIRLS—LIGHT TYPE.

From Final Report (1882-83) *of the Anthropometrical Committee of the British Association. (First four years from Holt.)*

Age last Birthday.	Height—Inches.	Increase.	Weight—Pounds.	Increase.
Birth	**20·6**		**7·5**	
	20·5		7·2	
1	**29**	**8·4**	**20·5**	**13**
	28·7	8·2	19·8	12·6
2	**32·5**	**3·5**	**26·5**	**6**
	32·5	3·8	25·5	5·7
3	**35**	**2·5**	**31·2**	**4·7**
	35	2·5	30	4·5
4	**38**	**3**	**35**	**3·8**
	38	3	34	4
5	**41**	**3**	**41·2**	**6·2**
	40·5	1·5	39·2	5·2
6	**44**	**3**	**44·4**	**2·2**
	42·8	2·3	41·7	2·5
7	**46**	**2**	**49·7**	**5·3**
	44·5	1·7	47·5	5·8
8	**47**	**1**	**54·9**	**5·2**
	46·6	2·1	52·1	4·6
9	**49·7**	**2·7**	**60·4**	**5·5**
	48·7	2·1	55·5	3·4
10	**51·8**	**2·1**	**67·5**	**7·1**
	51	2·3	62	6·5
11	**53·5**	**1·7**	**72**	**4·5**
	53·1	2·1	68	6
12	**55**	**1·5**	**76·7**	**4·7**
	55·6	2·5	76·4	8·4
13	**57**	**2**	**82·6**	**6·9**
	57·7	2·1	87·2	10·8
14	**59·3**	**2·3**	**92**	**9·4**
	59·8	2·1	96·7	9·5
15	**62·2**	**2·9**	**102·7**	**10·7**
	60·9	1·1	106	9·3
16	**64·3**	**2·1**	**119**	**16·3**
	61·7	0·8	113·1	6·8
17	**66·2**	**1·9**	**130**	**11**
	62·5	0·8	115	2·4
18	**66·9**	**0·7**	**137·4**	**7·4**
	62·4	—	121·1	5·6
19	**67·3**	**0·4**	**139·6**	**2·2**
	62·7	0·3	123·8	2·7
20	**67·5**	**0·2**	**143·3**	**3·7**
	62·9	0·2	123·4	—
21	**67·6**	**0·1**	**145·2**	**1·9**
	63	0·1	121·8	—

in weight, and *vice versa.* The most rapid growth in weight is in the autumn, the slowest in the summer months. Malling-Hansen distinguishes three periods: the most rapid growth in weight is from August till the middle of December; then till the end of April weight increases more slowly; while the slowest rate of all is for the next three months ending with July. For height, on the other hand, the period of maximal growth is from the beginning of April to the middle of August; the minimal period extends to about the end of November; while the intermediate period lasts till the end of March.

Besides this seasonal periodicity, all observations which have been made on a large scale, and some which have been made upon a few children measured year after year, show that there is also a larger periodicity. After the rapid growth of early childhood, there is a slight retardation about the time of school entrance, followed by acceleration. Then there is a time of somewhat slower growth from eight or nine to ten or eleven. But the most noteworthy feature of all is a marked acceleration of growth beginning shortly before the period of puberty. This prepubescent acceleration is noticed somewhat earlier in girls than in boys. Up to the eleventh year the two sexes gain in about the same ratio. From the eleventh to the thirteenth year the girls gain much more rapidly than the boys, and at the twelfth and thirteenth years they are actually taller, and at the thirteenth and fourteenth actually heavier, than the boys at the same age. At fourteen or fifteen the boys again take the lead, growing at first rapidly, then more slowly, until their growth is completed. The exact period during which girls surpass boys is differently stated by various writers, and evidently varies in different races and classes of society. The important point is that girls and boys have a period of rapid growth about the time of puberty, and that this occurs rather earlier in girls than in boys.

The process of weighing and measuring children is comparatively simple, but a good deal of care is necessary to ensure accuracy. At the present time we do not possess a sufficient amount of information regarding the physique of the school population in different parts of the kingdom, and the recent Interdepartmental Committee on Physical Deterioration (1904) suggests that a permanent anthropometric survey should be organized. This survey would have for its object the periodic taking of measurements of children and young persons in schools and factories, enlisting for this purpose the assistance, among others, of school-teachers and factory surgeons, supplemented by a small staff of professional surveyors. The work of this committee would be to collect uniformly and periodically throughout the United Kingdom the following measurements of all young persons: (*a*) Height; (*b*) chest girth—maximum and minimum; (*c*) weight; (*d*) head—length, breadth, height; (*e*) breadth of shoulders; (*f*) breadth of hips; (*g*) vision—acuity and colour vision; (*h*) degree of pigmentation.

The first three of these are of special importance in relation to the nutrition of the children.

Methods of Ascertaining and Recording Height, Weight, etc.

(*a*) *Infants.*—The method of weighing and measuring infants differs somewhat from that adopted in the case of older children.

Infants should be weighed without clothes. The usual method is to place the infant upon a spring balance, and to read the weight recorded on the dial. Surgical instrument-makers supply a balance specially constructed for the weighing of babies. The only difficulty in the process is that very often the child will not keep still, and as the balances are sensitive, the pointer swings about with every movement of the child.

Where it is desired to keep a record of the infant's progress, the weight should be ascertained once a week. Special charts are published for recording the weight in the form of a curve. A quite serviceable chart may be easily constructed with a sheet of paper ruled in small squares. Such a sheet of paper as children often use for arithmetic will serve the purpose very well.

The vertical lines upon the paper should be numbered to represent the age of the child in weeks. The horizontal lines should be numbered from below up to represent weights in $\frac{1}{4}$-pounds or $\frac{1}{2}$-pounds, according to the closeness with which the lines are ruled. Thus, the lowest line may be marked 6 pounds, and the alternate lines above marked 7, 8, 9 pounds, and so on. The average weight-curve of a healthy baby should then be made out on the chart in red ink. The weight of the baby under observation can then be recorded on the chart from week to week.

The *height* of an infant is measured with the child in the horizontal position. Perhaps the simplest plan is to place the child on the floor with the head just touching the wall. Then, taking care that the head continues in contact with the wall, the legs should be stretched out as straight as possible, a book or some such object being used to mark the extreme distance reached by the feet. The distance from the wall to the book will give the height of the child. After the child is able to stand, it may be of interest to measure the height standing to compare with height lying down. The latter will be found to be slightly greater.

(*b*) *Older Children—Weight.*—Weighing-machines are of two kinds, the spring-balance and the steelyard. The latter is more troublesome to use, but it can be graduated to an ounce, and mistakes from misreading are less liable to occur than when the spring-balance is used. Frequent testing of the accuracy of the machines is necessary.

School-children are usually weighed with indoor clothes on, but without boots. The weight should always be taken at the same time of day.

Height.—For ascertaining the height, a measuring-rod is often attached to the steelyard. Messrs. Avery of Birmingham make a convenient measuring-rod which can be screwed to a wall or door. When not in use, the head-piece can be turned flat against the wall.

The height, like the weight, should be taken without boots. The child should stand erect in the position of attention, with the head kept steady and the heels together. The heels, hips, shoulders, and head should touch the wall or the pillar of the standard.

Chest.—The chest should be measured at the level of the nipple, the tape being in direct contact with the skin. The child should stand erect with the arms hanging loosely by the side. In measuring recruits for the army the man is made to count ten during the process, to prevent his keeping the lungs overinflated. The same plan may be adopted in measuring children, especially if a child seems to be holding his breath. The maximum and minimum measurements should also be recorded, by making the child take as deep a breath as possible, and then let out as much as he can. It will often be found that the child has some difficulty in carrying out this movement voluntarily, and when this is the case an effort should be made to teach him.

CHAPTER VIII

SOME FACTS OF GROWTH

'Oh, what a wilderness were this sad world,
If man were always man, and never child.'
HARTLEY COLERIDGE.

THAT children differ considerably from adults in the proportions of their body is obvious enough, but probably very few people who have not had their attention specially directed to the subject could say precisely what the differences are. The differences are, of course, more marked the younger the child. If we compare an infant with an adult, the most striking points are as follows: The infant has a relatively enormous head, a very large and prominent abdomen, and a small chest. Its arms are large and powerful, while its legs are small.

The large size of the child's head is due to the cranium, the face being comparatively small. In early infancy, of course, teeth are absent.

The differences in proportion are well shown in such a table[1] as this:

Height of head of adult to that of an infant - -	2 : 1
Length of body of adult to that of an infant - -	3 : 1
Length of arm of adult to that of an infant - -	4 : 1
Length of leg of adult to that of an infant - -	5 : 1

[1] Kirkpatrick, *Fundamentals of Child-Study*, 1903.

The *physiology* of childhood differs in some important respects from the physiology of adult life.

Perhaps the most important difference is due to the fact that the child is a growing animal. An adult requires food to supply the energy he expends in work and to repair the waste of tissue which his work involves. The child likewise requires food to supply energy and to repair waste, but in addition a large amount of food is needed for the purpose of growth. For this reason the child's diet should not only be abundant in quantity, but it should contain a relatively larger proportion of tissue-builders (proteids and mineral matters) and a relatively smaller proportion of energy-producers (carbohydrates) than the food of the adult. The amount of energy expended by children varies very greatly with age. A young infant spends most of its time asleep, and when awake its expenditure of energy is not great. Little children, on the other hand, often romp about during almost every moment of their waking hours, and their expenditure of energy compared to that of the baby is very large. Accordingly we find that in infancy fat, which is of very great importance, not only as a fuel food, to supply heat to the body, but probably also as a tissue-builder, ought to bulk very largely in the diet, but that in older children a relatively smaller proportion of fat is needed, while carbohydrates should be more abundant.

A second difference between the child and the adult arises from the fact that the surface of the body is relatively large in proportion to its bulk. Now, the cooling of the body takes place for the most part through the skin; hence the child tends to lose heat rapidly. Here again we have a reason for the large proportion of fat required by the infant. In the natural food of the infant—mother's milk—fat constitutes nearly one-third of the total solids.

The Alimentary System.

The most obvious difference between the alimentary system of the child and that of the adult is found in the teeth.

The *temporary teeth*, of which there are twenty, should appear as follows:

1. Lower central incisors	6 to 8 months.
2. Upper central and upper lateral incisors	8 to 12 „
3. Lower lateral incisors and lower and upper first molars	12 to 15 „
4. Lower and upper canines	18 to 24 „
5. Lower and upper second molars	24 to 30 „

Delayed dentition is common even in children who are apparently healthy. But marked delay is usually due to disease, and especially to rickets.

The *permanent teeth*, of which there are thirty-two, appear in the following order:

First molars	6 years.
Incisors	7 to 8 „
Bicuspids	9 to 10 „
Canines	12 to 14 „
Second molars	12 to 15 „
Third molars (wisdom teeth)	17 to 25 „

The first molars appear behind the second temporary molars, and hence are often mistaken for temporary teeth. The other permanent teeth take the places of the corresponding members of the temporary set.

The *saliva* of the infant is scanty during the first few weeks, and it is notably deficient in the power of digesting starch. This power increases after the first few months of life, but is not well established till towards the end of the first year. The pancreatic secretion also does not acquire its full power of converting starch till towards the end of the first year. These facts obviously indicate the unsuitability of starchy foods for infants.

The *liver* is relatively very large in the child. The *stomach* is somewhat tubular in infancy, and plays a less important part in digestion than is the case in the adult. The *intestine* is relatively longer than in the adult, and the weakness of its muscular coat may partly explain the child's liability to flatulent distension of the abdomen.

The activity of the *circulation* in children is shown by the relative rapidity of the pulse. The younger the child the quicker is the normal pulse-rate. The pulse is temporarily quickened by exercise or emotion or by illness, especially if there is accompanying fever. During sleep or repose the average pulse-rate of healthy children is as follows:

6 to 12 months	115-105
2 to 6 years	105-90
11 to 14 "	85-75

The growth of the heart is not quite uniform with that of the body. Thus, during the period of accelerated growth which follows the beginning of the school period the heart lags behind the rest of the body. Then the heart grows somewhat more rapidly till about eleven. For a few years it just keeps pace with the increasing body-weight, and then, at about fifteen, there comes a period of more rapid growth, so that at about sixteen the heart is heavier relatively to the body-weight than at any other period.

In normal children *respiration* takes place through the nose. The advantage of this is that the air inspired is warmed almost to the temperature of the body before it reaches the lungs. Infants have the greatest difficulty in breathing through the mouth, and in them obstruction of the nasal passages may have very serious, even fatal, consequences. Older children get over the difficulty of nasal obstruction to some extent by breathing through the mouth, but tend to revert to nasal respiration during sleep. The obstruction of the free passage of air into the lungs may lead to deformity of the chest.

The movements of respiration are chiefly abdominal, and this type of respiration continues into adult life in the case of the male sex. In girls, on the other hand, the type of respiratory movement changes, and from the time of puberty breathing is mainly thoracic, the chief movement being in the upper part of the chest. This difference in type was formerly supposed to be a natural sexual characteristic, but the prevailing opinion now is that the female type of respiration is due to the influence of clothing.

The development of the *voluntary motor functions* is of the greatest importance and interest to the student of childhood. The importance of the subject lies in the fact that we have here the key to the development of mind. Every step in the progress of mental development is marked by an increasing power of direction and control of the muscles.

At the time of birth the child has plenty of muscular power. Its movements are strikingly vigorous. But they present no evidence whatever of being under the control of the will. Nevertheless, the earlier involuntary movements are regarded by modern psychology as being of great importance in preparing the way for the later voluntary ones. A movement which has been performed involuntarily a number of times is very easily set a-going again by an act of volition, and probably all the earlier voluntary movements are of this kind. At the same time, movements which have been carried out quite easily as reflexes often do require a good deal of time and practice before they can be readily carried out voluntarily. For example, the baby is able from the time of birth to grasp an object placed in the hand, yet the intentional holding of an object requires much practice and is slowly acquired.

It is difficult to say when the first voluntary movements make their appearance. The movements of the eyes come under control very early. By the third or fourth week bright objects may attract the gaze, and the eyes may even by the fifth week follow a slowly moving object.

During the first two or three months of life the hands may close mechanically on objects touching the palm. The hands also, in their movements, frequently get into the mouth and are sucked. By about the end of the third month there often appears to be some sort of effort to get the hands into the mouth, and objects clasped by the hand may be carried to the mouth unintentionally. During the fourth month objects clasped by the hands are carried to the mouth deliberately, while the head is often inclined to the object and the lips put out towards it eagerly. There can be no doubt that the tendency to carry objects to the mouth is at first solely instinctive, though it often has the appearance of being voluntary. A very good illustration of the deceptive appearance of some of the child's early movements is given by Sully, describing an infant eleven weeks old.

'Among the objects that attracted him was his mamma's dress, which had a dark ground with a small white flower pattern. His hand accidentally came in contact with one of the folds of her dress lying over the breast. A dozen times or more he repeated the movement of stretching out his hand, clutching the fold, and giving it a good pull. A hasty reasoner might easily suppose that the child had now learned to reach out to an object when only seen.

But the sequel showed this was not the case. Four weeks later, the diary observes, the child as yet made no effort to grasp an object offered to him. The clutching was thus a blind movement. Yet it was doubtless a step in the process of learning to grasp.'

Miss Shinn made a similar observation on her niece. On the forty-eighth day the baby carried to the mouth an object placed in the hand six times in succession, but several weeks elapsed before the same movement could be induced again. In these cases the movement was evidently carried out accidentally the first time, and the trick, having been once performed, repeated itself mechanically a number of times. And although the movement, once interrupted, could not be reproduced for a considerable period, we may believe that its early performance did give rise to sensory impressions and leave behind it memory traces which assisted the subsequent voluntary acquirement.

The first grasping movements of the infant are not influenced in any way by sight. Even after the child has become quite an adept at clasping objects and carrying them to the mouth the eyes often stare vacantly or look at something else during the process. The hands may even drop the object seized and go fumbling about for it without the eyes coming to their assistance. The child does not at first seem to realize that an object grasped may be the same as an object seen. By the end of the fourth or during the fifth month, however, the child begins to grasp at things it sees. At first this is done in an awkward, fumbling way, but skill is rapidly acquired, and the sense of distance also develops quickly. Miss Shinn says she never saw her niece snatch at an object (from the fifth month) more than 3 feet away. Children, of course, often stretch out their arm towards objects hopelessly out of reach, as in 'crying for the moon,' but this is frequently merely an expression of interest and desire rather than a real effort to grasp. Such stretching may also be experimental. The other day I was watching an infant left sitting in his high chair in the dining-room. For a considerable time he occupied himself quite happily by staring at the various objects about, and then stretching out and feeling about with first one arm and then the other in the direction of the successive objects of interest. All this was done very systematically and deliberately, but with no apparent expectation that the objects could be actually touched.

The thumb of the infant is not at first used in opposition, and for a considerable time after it can be opposed it does not seem strong enough or motile enough to be used in opposition. This is well seen in the manner in which a baby tends to lift a cup or tumbler by hooking the fingers over the rim. A baby is often well over six months old before he picks things up between the fingers and thumb.

During the second six months of life the child learns to grasp objects not merely for the purpose of putting them into the mouth, but in order to play with them. The finger-tips also gain in sensitiveness, and the forefinger becomes differentiated as an organ of investigation, and also for pointing.

Equilibrium and locomotion, like grasping, are acquired by a process of gradual development. During the first few days of life the muscles of the neck stiffen from time to time. As they increase in power they become able to raise the head momentarily. This power rapidly increases, and one of the infant's first accomplishments is the ability to support and turn the head. A stiffening of the back against a support is the beginning of sitting, and towards the end of the second three months the child may learn to draw itself up by its arms into the sitting posture. It is worth noting that the effort by which this is accomplished is precisely the same as that required to put an object into the mouth. Nature seems to whisper to the infant at this time, 'Take hold of everything and pull.' If the object taken hold of is a light, movable one, the pulling movement brings it into the neighbourhood of the mouth, and the lips feel about for it, seize it, and suck it. On the other hand, if the hands clasp some fixed object, such as the edge of the perambulator, the pulling effort, instead of bringing an object to the mouth, raises the child's body to the sitting posture, probably very much to the child's own satisfaction.

During the third three months sitting becomes more secure, and we usually find the first standing efforts, in so far, at least, as the legs tend to stiffen if the child is held with its feet on the floor. The different forms of creeping usually appear towards the end of this period, and are perfected during the succeeding three months. Many children even manage to walk a little by the time they are eleven or twelve months old, and I have known babies who could walk alone at nine months. The average age for walking is probably about fourteen or fifteen months. A child who cannot walk at eighteen months has certainly something the matter with it.

After infancy is past the development of voluntary motor power continues to progress rapidly, but is still very imperfect at the time the child enters school. Observations upon school-children have shown that at the age of six a boy possesses only about one-sixth of his sixteen-year-old strength. The chief increase takes place during the pubertal period. During the five years from eleven to sixteen the increase is about twice as great as that during the period from six to eleven.

Dr. Bryan[1] has tested children at different ages with reference to their power of tapping. The test consisted in tapping as rapidly as possible during a period of five seconds upon an electric key, which mechanically recorded the results. These experiments showed that ability increased throughout the school period, the greatest rapidity of movement not being attained till adolescence.

Precision of movement is likewise very defective in young children. By the time the child goes to school he has no doubt acquired a considerable degree of control over the members of his body. He can walk, and run, and jump. He can dress and feed himself, and, it is to be hoped, 'behave mannerly at table.' He has mastered the difficulties of articulate speech. But the finer co-ordinated movements are effected only by means of concentrated and fatiguing effort, or, perhaps, cannot be effected at all. Left to his own desires, he prefers games and plays which involve only a moderate amount of skill. Hoops, skipping-ropes, and toy horses are appreciated before the child devotes himself seriously to marbles, a game which requires much more finely co-ordinated movements.

The study of the acquisition of voluntary motor power and skill has led to a conception of the process which is often expressed by the formula that development proceeds from the fundamental to the accessory. By fundamental are meant essentially those movements which the human being possesses in common with the lower animals. The movements of the lips in sucking, of the jaws in eating, of the eyes in looking, of the trunk and limbs in locomotion, are all fundamental in character. By accessory are meant those movements which are the peculiar prerogative of man. The movements necessary for articulate speech and all the finer capabilities of the human hand belong to this

[1] *Am. Journ. of Psychol.*, November, 1892.

class. The fundamental movements are at first carried out involuntarily, in response to various sensory stimuli, and when the will gains control over them it but takes the reins of a going team. The accessory movements, on the other hand, requiring as they do a high degree of precision, delicate, yet complex, co-ordination, and innumerable finely adjusted sequences, are acquired by slow degrees and much practice. Their practice presupposes the maturity of the fundamental movements. Writing, for example, does not simply require finely co-ordinated hand movement, but implies control of the trunk and arm. It is to be noted, also, that the accessory movements do not depend upon the presence in man of any muscles peculiar to him. The same bones and muscles and tendons are present in the hand of the monkey as in the human hand. Yet how marvellous the difference in effect. The extraordinary dexterity of the human hand depends upon the complexity of the human nervous system, and to the nervous system of the child we may now turn our attention.

The nervous system of the child, like that of the adult, comprises central and peripheral portions. The central nervous system includes the brain and spinal cord.

The spinal cord is composed of a central core of grey substance, in which are numerous nerve cells, arranged in definite groups; and of a rind of white substance which contains no nerve cells, but is formed almost entirely of nerve fibres which run in a longitudinal direction. The colour of the white substance is due to the fact that each nerve fibre is surrounded by a sheath of a fatty material called myelin.

The brain is composed of a great central mass of white matter and of an outer cortex of grey matter. Within the white matter are embedded several masses of grey substance called the basal ganglia. The grey cortex forms a thin layer on the surface of the brain, but, as it is thrown into numerous complicated folds, it is really very voluminous.

The most important part of the peripheral nervous system is formed by the sensory and motor nerves. These nerves, which ramify throughout the body, are composed of myelinated nerve fibres. They may be traced upwards

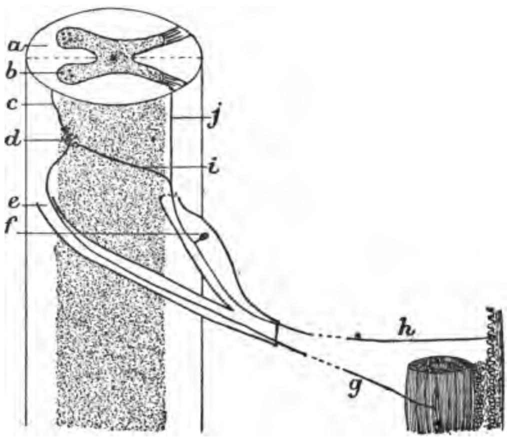


FIG. 1.—DIAGRAM OF SPINAL CORD AND NERVES.

a, White matter of spinal cord; *b*, grey matter (anterior horn); *c*, motor fibre descending from motor cell in brain; *d*, motor cell in anterior horn of grey matter; *e*, anterior (motor) root of spinal nerve; *f*, sensory nerve cell in sensory root of spinal nerve; *g*, a motor nerve fibre ending in a muscle; *h*, a sensory nerve fibre commencing in a touch corpuscle in the skin; *i*, branch of sensory fibre ending in ramifications near a motor cell; *j*, sensory fibre passing up towards brain.

into the central nervous system, where they are found to become continuous with the fibres of the white substance of the brain and spinal cord. Every nerve fibre ultimately becomes connected with a nerve cell. The nerve cells which give rise to the motor fibres are situated in the grey matter of the brain and spinal cord. The cells belonging to the sensory fibres, on the other hand, are not actually within the central nervous system at all, but are situated in little swellings called ganglia on the roots of the sensory nerves. Each sensory nerve cell gives off a fibre which splits into two portions, one of which passes into the sensory nerve, while the other passes into the central nervous system.

At the time of birth the brain is relatively of very large size in proportion to the rest of the body. In the adult the brain makes only about 2 per cent. of the body-weight, while at birth it constitutes more than 12 per cent. That is to say, the brain at birth is six times as heavy relatively to the body-weight as in adult life. After birth the brain grows with extraordinary rapidity. During the first nine months of life nearly one-third of the total increase of the weight of the brain is added. The second third is added by the time the child is two and a half years of age. By the end of the seventh or eighth year growth in weight is practically complete, the rate of increase after this being very slow.

Although the central nervous system appears externally to be so well developed at birth, it is in reality exceedingly immature. This immaturity is shown in two ways.

In the first place, the nerve cells of the grey matter are in a very undeveloped condition. It is believed that the nerve cells do not increase in number after birth. A new-born baby has as many nerve cells as it will ever possess. But during the progress of development the nerve cells grow in size and in complexity of structure. An immature nerve cell consists simply of a mass of protoplasm with a nucleus. A mature nerve cell is not only of larger size, but its protoplasm is prolonged into a number of branching processes which, under a high power of the microscope, look not unlike miniature trees.

In the second place, a very large proportion of the nerve fibres are not in a condition of functional maturity at the time of birth. It has been mentioned that the nerve fibres are surrounded by fatty or myelin sheaths. These sheaths have no nervous function, but are believed to serve the same purpose as the insulating material which surrounds the separate wires of a telegraph cable. Now, at birth a very large proportion of the nerve fibres of the central nervous system are without this insulating sheath, and it is believed that until the sheath appears the fibres are not functionally active. This discovery has proved of the greatest assistance in the investigation of the nervous system, because it has been found that the various bundles of nerve fibres acquire their sheaths at different periods. Accordingly, by careful microscopic examination of the brain and spinal cord of children of different ages, it has been possible to ascertain with some degree of exactness the order in which the various parts of the nervous system arrive at functional maturity. Obviously, it becomes of the greatest interest to compare the results of investigations upon the structural development of the nervous system with the results of studies upon the functional development of the child.

At birth the nerve fibres of the spinal cord are pretty well myelinated, but in the brain myelination has scarcely commenced. This would seem to indicate that the spinal cord is the only part of the nervous system which is functionally active. With the spinal cord, however, must be included the medulla oblongata, which, although it is situated within the skull, is really simply the large upper extremity of the cord. These anatomical observations agree precisely with observations on the new-born human infant. The activities of the infant at birth are precisely those which physiologists tell us are able to go on in the absence of the brain. Breathing, crying, the beating of the heart, the moving of the limbs in response to sensory stimulation, are all reflex acts which take place independently of volition or consciousness.

Some time after birth myelination commences in the important strands of fibres which pass downward from the motor centres of the brain to the spinal cord, and we may find here the anatomical basis of the developing voluntary power. It will be remembered that I spoke of the child's first voluntary movements as a mere deliberate setting-a-going of movements which had been again and again mechanically performed. Now, it is interesting to note that these fibres, which pass down from the brain, and which appear to carry volitional impulses, do not themselves pass out to the muscles. On the contrary, they end in the spinal cord in the neighbourhood of the motor cells concerned in reflex movement. We may suppose, therefore, that at this time a group of nerve cells in the spinal cord, whose discharge will bring about some particular movement, may be set off either by an impulse reaching them from below, along the sensory nerve fibres, or from above, along the fibres which come from the motor cortex of the brain. To the former class belong the reflex movements, while volitional movements are included in the latter.

The part of the cortex of the brain which contains the motor centres is now believed to store up the motor sensations which result from muscular movement. Hence it may be described as the sensory-motor area of the brain. Other portions of the cortex are concerned with the special senses, and physiologists have defined visual, auditory, smell, and taste centres. But a very large part of the cortex remains which appears to serve as centre for neither movement nor sensation. What can its function be?

Some light has been thrown on this subject by the researches of Flechsig, which are so interesting and important that they deserve some mention here, although they have given rise to a good deal of controversy, not yet settled.

According to Flechsig, the fibres from this region of the cortex, which are very late in maturing, and which are very difficult to trace because they are not easily distinguishable from previously myelinated fibres coming from other quarters, neither come from nor go to the ganglia at the base of the brain, as was formerly believed. On the contrary, they pass to other areas of the cortex already developed—namely, the various sensory and motor centres—thus bringing them into relationship with one another. On this anatomical basis Flechsig has reared the theory that this area serves the function of associating the different sensory and sensory-motor centres together, and that it is, moreover, the part of the brain which is concerned in perception and in the higher mental functions.

From what has been said it will be clear that the central nervous system of the child is not by any means a homogeneous organ, but that it is gradually built up of elements which have their own definite functions to perform. Following a suggestion made many years ago by Dr. Hughlings Jackson, it is customary to speak of these various elements as being arranged upon three different levels. The lowest level is constituted by the spinal cord and medulla with their centres for reflex movements, for the heart, the abdominal movements, and respiration. These movements, which are at the lowest level functionally, are the oldest racially. Among the lowest vertebrates they are the only movements possible. In Amphioxus, for example, a fish-like animal, the nervous system is represented practically by a spinal cord. Although this is slightly swollen at its anterior end, there is nothing that deserves to be dignified as a brain.

The second or middle level comprises the sensori-motor cortex of the brain and the various centres for the special senses. This level begins to appear very low down in the vertebrate scale, but among the lower vertebrates—fishes, amphibians, and reptiles—it is poorly represented. Among the lower mammals it is still comparatively poorly developed, but its importance increases as we ascend the scale, and in the higher mammalia—for example, in the monkeys—it reaches a high degree of complexity.

The third or highest level is constituted by the association centres of Flechsig. These centres may be regarded, from the evolutionary point of view, as the accessory portions of the nervous system. The lower levels are associated with those vital functions and activities which are fundamental, and which we share with the lower vertebrates. The highest-level centres which are represented in the apes in only a very rudimentary way, and which in the lower mammals are scarcely represented, if at all, are the centres for the special gifts of man, for his complex co-ordination of movement, for his intellectual and moral faculties, for his appreciation of literature, music, and art.

While it is true in a general way that these centres develop from below up—first the lowest level, then the middle level, and then the highest—this is only part of the truth. Each level of the nervous system is itself built up out of a number of centres which have their own periods of development, so that we find the lower centres of one level beginning to function before all those of the level below have reached maturity.

The various centres pass through three stages of development. First there is an immature or inactive period. This is followed by a period of rapid growth and development, which admits of considerable modification by the influence of environment. This nascent period, as it is called, often commences somewhat suddenly. Its duration varies very considerably. It terminates by merging more or less gradually into a period of maturity, during which further modification is very difficult or impossible.

The nascent period of the various centres should obviously be of the greatest interest to the educator. A natural education may be defined as one which follows the nascencies of the various centres. To a certain limited extent all education may claim to be of this kind, inasmuch as it is only during their nascent periods that the various centres are capable of modification by education. No one attempts to teach the rule of three to a child of two, and a man who learns a foreign language in adult life rarely attains the fluency of speech or the correctness of accent which he would have acquired had his studies been pursued while the language centres were in the plastic stage. But although from time to time educational reformers have proclaimed that in education the developing mind should be taken into account, educators have, on the whole, remained content to base their methods upon the logical development of the subject to be taught. The theory that educational methods should be based upon an understanding of the normal developmental tendencies of the mind to be educated is becoming more and more popular as our knowledge increases. The nascent period of any particular form of development seems to afford the educator an opportunity which he never has at any other time.

While we have sufficient knowledge of the minute structure of the brain at different periods of development to give an anatomical basis to the theory of nascent periods, a more detailed knowledge of the various nascencies must be based upon the study of developing function. Such studies confirm the arrangement of the nervous system into three levels.

The functions whose centres belong to the lowest level are either active before birth, or have a period of very rapid nascency shortly after birth. The functions of respiration, sucking, swallowing, digesting, are called into activity after birth, and it is essential to the life of the child that functional competency should be attained almost immediately.

The middle level functions include the development of the special senses, and of voluntary control over the muscles. The nascencies of the various functions are indicated by the appearance throughout childhood of successive instincts and interests. It is obvious enough that in learning to walk and to talk the child is assisted enormously by impulses from within. Just imagine the task of teaching a child to talk who had no desire to learn. There are such children. We call them idiots, and take no blame to ourselves for our failure to educate them to a normal standard. The intense desire of the normal child to look at things, to touch and handle and experiment with them, indicates the period of nascency of the centres for the special senses. If these are not well trained in childhood, they will be more or less defective throughout life. All the various interests which crop up so strongly during childhood indicate some want on the part of the nervous system, some centre which is coming into its nascent period and is crying out for food. To neglect these interests in education is simply to fly in the face of Nature.

The period of adolescence is that during which we find the nascencies of the higher mental functions. During childhood we should train the senses; we should cultivate the motor functions, paying due deference to the natural sequences of development; we should train the power of expression and store the memory; but we should not expect rational thought and judgment except in a very elementary degree. With adolescence there comes a rapid uplifting of the mental powers. The whole psychic life is raised to a higher level. Subjects which the child could not understand before, or which could be partially grasped only with the greatest difficulty and with obvious distaste, now prove attractive and are mastered with ease. A train of reasoning can be followed; literature can be appreciated; history, politics, science, can now be intelligently studied.

CHAPTER IX

THE SENSES AND THE NERVOUS SYSTEM

'Childhood has its own ways of seeing, feeling, thinking.'
ROUSSEAU.

THE theory of nascent periods[1] is nowhere better illustrated than by the development of the special senses. No one who watches the development of a child can doubt that the early years of life constitute the nascent period of the senses.

As has already been mentioned, the various special senses have definitely localized centres in the cortex of the brain. At birth these centres are, like the rest of the cortex, in a very imperfect condition. Two very important facts relating to their development require emphasis here.

The first of these is that the further development of these centres after birth does not take place spontaneously, but awaits the arrival of stimuli from without. The visual centre of a child who is blind from birth never undergoes development at all. The child may grow to adult age, but the part of the brain which should have become the centre for vision remains of small size, and the cells in it never attain the size or the complexity of structure which they ought to reach.

The second fact is that the functioning of the various

[1] *Vide* Chapter VIII.

centres is a very complex process, which results not from the centres acting singly, but from the co-operation of several centres.

This fact may be illustrated by the consideration of what takes place in the act of perception.

When we look at an object, an image is formed upon the retina of each eye. This image is, of course, inverted, just as is the image in a photographic camera. Many people puzzle themselves quite needlessly as to how it is that we see objects in their proper positions when the retinal image is upside down. The reason is obvious enough. It is that we do not see things with our eyes, but with our brains!

The child undoubtedly begins to see objects before it has any idea of up or down, right or left, far or near. In other words, it can see before it is conscious of space. It is now generally held that the sense of space is acquired by each individual. In the process of acquisition the muscular sense must play a very large part. Probably the child's experience of being carried about from one place to another helps the process. The manner in which children are picked up, danced up and down, and tossed up in the air must play an important part in developing a sense of the third dimension of space.

Now, during the time a child is learning to see, an association is built up between the movements of the eyes and the various parts of the retinal image, which become clear as the eyes are moved in various directions. With the movement of the eyes we must associate the movements of the head. When the baby first begins to look about it, any part of the retinal image *might* represent the top of the object looked at. But as the child learns to move its head up and down, or right and left, or to move its eyes in similar directions, the part of the image which becomes clear on throwing up the head or on raising the eyes is naturally interpreted as corresponding to the upper part of the object. If the head and eyes are raised, the child sees the ceiling; if they are lowered, the floor comes into view. The ceiling then is 'up,' the floor is 'down,' although the images of ceiling and floor upon the retina are respectively below and above.

The normal field of vision is very wide, but the area of clear definition is very small. Let the reader try the experiment of holding a penny about a foot in front of him and looking at it. While looking at the penny he will be able to see at the same time practically the whole of the room except what is behind him. He will be quite conscious of the bookcase to his right and the sofa to his left, but the penny alone will be seen clearly. Moreover, if he will look at the word ONE, he will notice that the word PENNY is a little out of focus; and if, without moving his head or the penny, he will direct his gaze to the word PENNY, he will be conscious that in doing so he has moved his eyes. Even such a very slight change as is necessary in directing the attention from one letter to the next, or even from one prong of the trident to its neighbour, is effected by a distinctly recognizable movement of the eyes.

The muscular sense tells us something more than the relative positions of the objects we are looking at: it plays the most important part in our judgment of size and distance. An object as large as a house may throw on my retina an image of precisely the same size as the matchbox over there on the mantelpiece. Why do I not confuse the size of the two objects? Because I judge that the one is several hundred yards away and the other just out of reach of my arm. This judgment, again, depends upon the different efforts required to focus clearly the respective objects. When I look at a near object, I require to contract a muscle within the eyeball in order to bring it clearly into focus. Moreover, I require to make my eyes converge, in order that the image may be focussed upon the most sensitive parts of the two retinæ. The nearer the object is, the greater the exertion needed to bring about these two movements of accommodation and convergence. By the effort required I judge the distance of the object I am looking at. When I know the distance of the object, I can form an estimate of its size.

I see a silk cushion about ten feet from me. What centres are involved in this act of perception? They are those of vision, muscular sensation, and touch. When I look at the cushion, the formation of a clear image upon the retina is accompanied by a visual sensation, due to the stimulation of the optic nerve, a sense of effort associated with the accommodation of the eyes, and a revival of old associations between touch sensations and visual sensations. I recognize that the cushion is covered with silk, because in childhood I handled silk and other materials thousands of times, and so built up an association between their appearance and their texture.

Moreover, as soon as I begin to tell what I see, I call into action other centres still, for I have to recall the words necessary for description, and to set in action the centres for spoken or for written speech.

Perception, then, is a very complex process. And what has been said about perception applies, broadly speaking, to the other senses also. All the senses depend upon experience for their normal development, and upon the co-operation of a number of centres in different parts of the brain for their healthy functioning.

As soon as this is understood, it becomes apparent how absolutely essential it is that young children should be supplied with abundance of material to touch, and handle, and taste, and smell. 'You may look, but you mustn't touch,' is a phrase which should be banished from the nursery and the schoolroom. The child's natural instincts tell him to touch everything he sees if he can get hold of it, and it is certainly the fact that children cannot see things properly unless they can handle them, and stroke them, and turn them about for themselves.

Nature-study is a recent introduction in the class-room, but the normal child is a nature student before he cuts his first tooth. The question, Why introduce nature-study—still another 'subject' for the harassed teacher—into the school curriculum? should be answered, Scotch fashion, by another query, Why keep it out?

The primary aim of nature-study should be to assist Nature with the task she has in hand when the child goes to school—the training of the senses. In carrying out this task we should find out just where the children are, and begin there. We should make use of such things as the children are already interested in, and exercise their powers of observation and comparison and description a little more systematically than would be done outside the school. But wherever we begin, the great point is that there should be abundance and variety of material, and that each child should see and handle and experiment for himself. The teacher who shows her class a sponge, and points out the holes in it, and has the class recite in chorus, 'It is porous—porous!' may imagine she is teaching, but she deceives herself. If the children are to have a lesson on the sponge, and to learn its properties of porosity and absorbability, and the names for these, it is absolutely essential that each child should have his piece of sponge to handle and squeeze, and rub on his face, and taste—oh yes, they will taste them, especially if they are told not to—and poke his fingers into. Each child must have a saucer with a little water, and must ascertain whether his particular sponge can absorb the water in his particular saucer, and whether the water can be squeezed out of the sponge again.

Beginning thus with the study of objects already more or less familiar, the teacher should try to widen the circle of interest, and to encourage the children, not merely to observe, but to think for themselves. Questions should be asked which the children can find answers to by examining the material in their hands. The power of observing will be aided greatly by the systematic describing of what is seen. In expressing what they have learned the children should not be expected to depend on language only, but drawing should be freely used, not with the object of artistic presentation, but as a mode of diagrammatic representation. Drawing from memory is a very valuable exercise, but should be used in moderation. It is specially useful in indicating to the teacher cases of insufficient or erroneous observation. The correction of errors by the children after a fresh examination of the object is an important aid to careful and exact observation. Children usually get the credit of being far better observers than they really are. This is due to the fact that their attention is caught by a great many things which do not interest the adult, and are therefore unnoticed by him. Accordingly, when an unfortunate grown-up undergoes a cross-examination upon the different kinds of green stuff to be found upon trees, upon the varieties of cab-wheels, or upon the reason why some stones are good for making sand and some are not, he cannot but marvel at the observing powers which prompt the questions. Children's own investigations, however, are carried on within a pretty limited range; their observations are often inaccurate and their deductions erroneous. All the more need is there, then, that the school should rise to its duty of training the senses, of developing the observing powers, and of teaching children the habit of reasoning about things for themselves.

SIGHT.

One of the most important results of the study of the physical condition of children is the discovery of the fact that the schools are responsible for the production of a great deal of short-sightedness among the pupils. Short-sightedness is not very common in children under school age; but amongst the pupils in school the proportion who are short-sighted increases with every year of age. This conclusion has been arrived at in every country where a systematic investigation of the vision of school-children has been made. Thus, Seggel in Germany found 2·8 per cent. of the children short-sighted at six years of age, 12 per cent. at ten years, 36 per cent. at fifteen years, and 51 per cent. at eighteen years. Although the proportion of short-sighted pupils is higher in Germany than in France, England, or America, investigators in these countries have reached the same general results. The matter is an extremely important one. Not only is a short-sighted child handicapped in his school-work, but in after-life he is shut out altogether from certain occupations, and his usefulness in others is greatly impaired. Moreover, in a certain proportion of cases short-sightedness is liable to become worse and worse, until it ends in actual blindness.

Short-sightedness is not the only variety of refractive error, but from the school point of view it is the most important. It is the only form which the school can be accused of causing, and which suitable school conditions can do much to prevent.

ERRORS OF REFRACTION.—The normal or emmetropic eye may be defined as one in which, when at rest, parallel rays are brought to a focus on the retina. When a person with normal vision is looking at distant objects his accommodation is at rest. Accommodation becomes necessary when he looks at near objects—say, within 20 feet. The chief errors of refraction are as follows:

(*a*) *Myopia, or Short-sightedness*.—This condition is due to the eyeball being abnormally long, so that parallel rays come to a focus in front of the retina. Accordingly, distant objects produce a blurred image on the retina and are not clearly seen. The greater the degree of myopia, the nearer an object must be held to the eye in order to be seen clearly.

(*b*) *Hypermetropia, or Long-sightedness*.—In this condition the eyeball is abnormally short from point to back, so that parallel rays passing through the pupil would, if prolonged backward, come to a focus behind the retina. Distant objects, therefore, produce a blurred image on the retina; but the long-sighted person, by exerting his accommodation, can shorten the focus of the lens, and can thus see distant objects clearly. To see near objects he has to exert his accommodation still more. Such persons, therefore, can often see both near and distant objects quite well, but the incessant strain thrown upon their accommodation is liable to give rise to fatigue, headaches, and other trouble. If the hypermetropia is of high degree it may be impossible, even by straining the eyes, to get a clear image of near objects. Children suffering from such a high degree of hypermetropia often tend to hold their book near their eyes, not because they can get a clear image in this way, but because, being unable to get any but a blurred image, they prefer a big blurred image to a small one. It inevitably happens that such children are usually supposed to be short-sighted.

(*c*) *Astigmatism.*—In astigmatism the image is distorted, very much as is the reflection in a curved mirror or in the bowl of a spoon. The error is due to irregularity in the curvatures of the refracting media of the eye. Slight degrees of this defect are very common, and are of little significance, but severer degrees require correction by suitable spectacles.

Hypermetropia and astigmatism are congenital defects. Hypermetropia is most common in young children, and tends to improve as the child gets older. Astigmatism probably does not alter materially with age.

Myopia, on the other hand, is not, strictly speaking, congenital—that is to say, the future myope is not born short-sighted—but it must be admitted that some children are born with a much stronger tendency to myopia than others. In conditions which favour the production of myopia these children are the first to suffer. But children who have no hereditary tendency to myopia may undoubtedly be rendered myopic by conditions which favour the occurrence of this defect.

The conditions which tend to produce myopia are, in the first place, those which necessitate straining of the eyes. Thus, working in a bad light, reading small or bad print, and examining small objects or objects held near the eyes, all involve great strain of the accommodation. But subsidiary causes also play a part in causation, and of these malnutrition and feeble health are believed by many ophthalmologists to be important.

To diminish the incidence of myopia the following rules should be attended to:

1. Schoolrooms should be sufficiently lighted. Pro-

fessor Cohn, the greatest authority on this subject, thinks that the area of the windows of a schoolroom should equal at least one-fifth of the floor-space. The sky should be visible from every seat in the room. The seats should be so arranged that the light should fall from the left of the pupils. Under no circumstances should the pupils be allowed to sit facing the windows.

2. Seats and desks should be so arranged that the pupils do not require to stoop over their work.

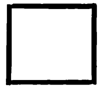
3. There must be a distance of at least 10 inches between the eye and the work.

4. The object looked at must be quite easily distinguishable.

The younger the child the more important it is that these rules should be strictly adhered to. Young children should not be allowed to do fine work of any kind. From what has been said in the early part of this chapter, it should be clear that fine work and poor illumination are likely to result, not only in strain of the eyes, but in strain of the developing nervous system. Many of the original kindergarten occupations are to be condemned on these grounds, and, indeed, have already been discarded in the land of their birth.

One very important cause of eye-strain during school-life is defective print in school-books. School-books should be printed in very clear type. The print should be deep black. The paper should be good, and should not be highly glazed. Cohn lays down the following rules: The height of the smallest *n* should not be less than 1·5 mm.; the least distance between two lines of print 2·5 mm.; the thickness of the stroke of a letter not less than 0·3 mm.; the greatest length of the line 100 mm.; and the greatest number of letters in one line sixty.

To determine whether the print of a book is of the character described, Cohn recommends the following plan: In a piece of card cut a hole 1 square centimetre in size, thus—



Place the card upon a page of the book to be tested, with the lower edge of the hole immediately above a line of print. If the type is satisfactory, not more than two lines of print will be visible through the hole.

TESTS FOR VISION.—As a test for vision, Cohn recommends the use of a letter E in size 1 centimetre square, thus—

E

Such a letter should be seen with each eye separately at a distance of 6 metres (about 20 feet). A child may be supplied with a similar letter cut out of cardboard. The test letter, printed on a piece of white cardboard, may be turned into various positions, and the child may be required to turn his letter into corresponding positions. In carrying out this and the other tests to be mentioned, two points must be attended to. Firstly, each eye should be tested separately, the unused eye not being closed or bandaged, but covered by a card. Secondly, the observer must make sure that the child understands what is wanted. Failure to realize the importance of the latter point has often led observers to place the proportion of defective vision, especially among young children, at a considerably higher figure than really existed.

Snellen's Test Type.—Snellen's test sheet can be obtained from opticians for a few pence. It should be pasted on cardboard and hung upon the wall in a good light. Care should be taken to keep it clean. It should not be left hanging where children who are to be tested can see it and become familiar with the letters.

The letters upon the sheet are printed in rows, the letters of each row being smaller than those of the row above. The letters are carefully drawn of a particular size, and the figures faintly printed above each row indicate the distance in metres at which the letters of that row can be read by the normal eye.

The person to be tested should stand 6 metres (20 feet) from the sheet and read the letters aloud from above down, first using one eye, then the other. If his vision is normal, he will be able to read the smallest letters (marked 6 on the sheet) with each eye. His vision is then stated thus: R. $\frac{6}{6}$, L. $\frac{6}{6}$. The letters R. and L. stand for the right eye and the left eye respectively.

If the smallest letters recognizable at 6 metres by the right eye were those marked 12, and the smallest recognizable by the left eye those marked 24, then the vision would be stated thus: R. $\frac{6}{12}$, L. $\frac{6}{24}$.

This test can readily be carried out in school by a teacher, and by its means the children whose vision is most defective can easily be picked out; but it should not be taken for granted that those whose vision is $\frac{6}{6}$ are normal, because a child with a slight or moderate degree of hypermetropia may be able, by using his accommodation, to see the smallest letters at 6 metres. Still, if the teacher can pick out those children whose vision is insufficient for the test, something is gained. These children should be given places in the classroom where they will be able to see the board to the greatest advantage, and their parents should be advised to take them to an oculist for examination. Where a systematic examination of the vision of the children is carried out by an oculist—and this should be done periodically in all schools—a preliminary test by the teacher will allow of the worst cases receiving attention first.

Squint is a condition which should also receive attention in all cases—not less where it is transient and occasional than where it seems permanent. All children suffering from squint should have the benefit of expert advice.

Hearing.

No less important than defects of vision are defects of hearing. It would probably surprise most school-teachers to know how many of their own pupils suffer from partial deafness in one or both ears. The recent investigation of school-children in Scotland showed that in Aberdeen 13·8 per cent., and in Edinburgh no less than 42 per cent., of the children examined were the subjects of defective hearing. In some schools in poor districts in England the proportion of children suffering from deafness has been found to be over 50 per cent.

Slight degrees of deafness are readily overlooked, not only by parents and teachers, but by the children themselves. Nevertheless, even slight deafness is of great importance from the school point of view. A child who is slightly deaf may be able to hear well enough when directly addressed, but during the routine of school-work the effort required to hear properly quickly produces fatigue and inattention. Such children, therefore, are likely to lose a good deal of the instruction, and to fall behind in the class-work.

The causes of deafness are very varied. Amongst them is one which must be specially referred to, both because it is the most common and because it is readily amenable to treatment. This condition is the presence of adenoid tumours, commonly called adenoids, in the naso-pharynx. In many schools which have been examined 10 per cent. of the children have been found to suffer from adenoids, and in schools attended by very poor and badly-nourished children the proportion may be over 40 per cent.

Children suffering from adenoids are commonly called mouth-breathers. As the naso-pharynx is blocked by the adenoids, the child has to breathe through the mouth, which is kept open night and day. In marked cases the children acquire a very characteristic physiognomy. Not only is the mouth kept open, but the nose appears laterally compressed, and the expression of the face is dull and stupid. The tone of the voice may be altered, producing the so-called 'dead' speech, and the letters *m* and *n* are imperfectly enunciated. The general health is apt to be impaired, and if the condition begins early in life, as it usually does, there may be deformity of the chest, resulting from the imperfect entry of air.

Such children are naturally seriously hampered both bodily and mentally. Owing in part to their feeble health and in part to their deafness, they appear to their teachers lazy and stupid, and are liable to be unjustly punished for perversity and inattention. The cause of the condition is not known. Malnutrition doubtless plays a part in the causation, while repeated attacks of nasal and post-nasal catarrh appears to be an important, if not the most important, factor. Some believe that adenoids are often congenital. They are certainly not uncommon in quite young infants.

It is obviously very important that teachers should be well acquainted with this condition. It is one which is readily and satisfactorily treated by a comparatively simple operation, and it is remarkable how quickly the bodily and mental condition of the children improves after the adenoids have been removed. Some physicians believe that early cases can be cured by checking the habit of mouth-breathing, and giving the children drill in breathing exercises. Such exercises are undoubtedly of very great value for all children of feeble vitality and poor physique. They cannot be expected to cure severe cases of adenoids, but in such cases they should be used carefully and systematically *after* the adenoids have been removed, and it has been made possible for the child to breathe easily through the nose.

TESTS FOR DEAFNESS.—In children, and especially in young children, it is often difficult to obtain satisfactory results from the ordinary tests for hearing. For practical purposes it is often sufficient to ask the children simple questions in ordinary tones, and note how they respond to them. The teacher who is alive to the fact that from 5 to 50 per cent. of his pupils are more or less deaf should have little difficulty in finding out which are so affected.

The principal tests used are (*a*) the watch, and (*b*) the voice. The children should be tested, one at a time, in a perfectly quiet room.

(*a*) *The Watch Test.*—The watch used should tick loudly enough to be distinctly audible at a distance of about 10 feet. A number of persons whose hearing is normal should be tested, in order to ascertain the exact distance at which the tick can be heard.

The child to be tested should stand with his eyes closed, and should be allowed to hear the tick of the watch when held close to one ear. The other ear should be covered by the hand, or it may be plugged with a little cotton-wool.

The observer now holds the watch at too great a distance from the ear to be audible—say, 12 or 15 feet. The watch should then be brought nearer and nearer, and the child asked to say when he can hear the tick. The test must be repeated a number of times, as children often imagine they can hear a sound when they cannot. Although an ordinary watch serves the purpose quite well, a stop-watch is better, as the accuracy of the child's replies can thereby be gauged.

If a watch which should be audible at 10 feet is heard by the right ear at 5 feet, and not at all by the left ear, a note should be made as follows: R. $\frac{5}{10}$, L. $\frac{0}{10}$.

(*b*) *The Voice Test.*—For this test let the child stand at the end of a room with his eyes shut and (1) both ears unclosed, (2) one ear closed and the other turned towards the observer. The child is told to repeat whatever words he hears. The observer gradually approaches the child from the other end of the room, repeating in a moderately loud whisper some familiar words—*e.g.*, 'twenty-three,' 'ninety-four.' Simple questions may be asked instead.

The Other Senses.

Schoolroom investigations will be limited as a rule to the senses of sight and hearing. The other senses differ no less markedly in individuals, and are no less capable of cultivation. The latter fact becomes of practical importance in the case of children who are blind or deaf. Julia Brace, a *blind* and *deaf mute*, is said to have been able to sort the clothes of the other pupils of the institution where she lived even after they had been washed!

The delicacy of the sense of touch is impaired by fatigue, and this has been utilized as a school test.

Simple tests are as follows:

Taste.—Have in separate glasses very weak solutions of salt, sugar, vinegar, and quinine. Two or more solutions of different strengths should be prepared of each variety. Have the children tell which of the solutions are sweet, salt, bitter, or sour after having a few drops placed upon the tongue. The mouth should be rinsed out, and two minutes allowed to elapse between each two solutions tasted. In the weakest solutions the taste should be just perceptible.

SMELL.—Make a series of solutions of oil of cloves in Lucca oil in the proportions of 1 in 10, 20, 40, 60, 80, 100, and 200. The bottles containing the solutions must all be of the same size and contain the same amount of fluid. Test the children by beginning with the weakest solution, and working up until the odour can be perceived; or mix up the bottles, and ask the child to arrange them in order of strength.

TOUCH.—The distance at which separate points can be felt as separate varies very greatly in different parts of the body. The instrument used for testing is called the *æsthesiometer*. It has two points like a pair of compasses, and a scale on which can be read off the distance of the points from one another. The distance in millimetres at which two points could be distinguished by a boy of twelve is thus stated by Landois and Stirling (*Text-Book of Physiology*): Tip of tongue, 1·1; tip of finger, 1·7; second phalanx of finger, 3·9; tip of nose, 4·5; eyelid, 9; forehead, 18; back of hand, 22; neck, 36.

Touch may also be tested for the appreciation of roughness and smoothness. For this purpose Dr. Graham Brown's æsthesiometer is used. This instrument has a smooth surface, like that of a door-handle. By turning a graduated screw, six little rods can be made to project by degrees from the surface, and as soon as the roughness produced by the projection of these rods can be appreciated by the touch the amount of projection is read off on a scale.

CHAPTER X

THE HEALTH OF THE CHILD

'The first wealth is health.'—EMERSON.

IT seems natural to associate the ideas of disease and death with declining years. Hard facts, however, in the form of the statistics of infantile mortality, or of the age-incidence of the infectious diseases, indicate sadly enough that death exacts a heavy toll of helpless childhood, and that even those children who escape have a terrible gauntlet to run.

THE HEALTH OF INFANTS.

By infantile mortality is meant the number of deaths of children under one year of age per 1,000 births. In 1896 the infantile mortality in England and Wales was 147·5 per 1,000, and corresponded almost exactly with the mean of the preceding ten years.[1] Among the great towns it ranged from 131 in Huddersfield and 135 in Croydon to 220 in Burnley and 262 in Preston.

A part of this mortality is due to premature birth, to congenital defects, and to inherited weakness or disease. A very large part is due to environmental conditions. This is indicated by the fact that the infantile mortality shows very great differences in different districts, but that in any given district there is very little variation from year

[1] Newsholme, *Vital Statistics*, 1899, p. 121.

to year. Thus in one part of a town 90 infants may survive out of 100 born, while in another district only 60 or 70 may survive. In rural districts the mortality is much lower than in towns. The highest mortality is met with in the large industrial centres.

Amongst the conditions which exert a deleterious influence, inexperience, ignorance, and neglect on the part of the mothers are very important factors. Neglect is largely due to industrial conditions. In many towns where women are largely employed in mills mothers resume work soon after childbirth. The infants are entrusted to strangers during the day, and are commonly fed on unsuitable food.

Improper food is certainly responsible for a considerable part of the infantile mortality. Not only is farinaceous food freely given to young infants, but the milk which is used is unclean or sour, and the feeding-bottles are frequently dirty.

A high infantile mortality necessarily implies a large incidence of disease. For every infant that dies there must be several who fall seriously ill, and many of these must be injured, perhaps for life. How prone infants are to disease may be illustrated by the large proportion of babies among the patients of a children's hospital. I find that out of 6,000 children of all ages (up to twelve) attending the medical out-patient department of the Royal Hospital for Sick Children in Edinburgh, 1,550 were under one year of age and 2,720 were under two years. Of the children under one year no less than 46·5 per cent. were suffering from affections of the digestive organs, the result, with few exceptions, of improper feeding.

The assertion that a considerable proportion of the infantile mortality is due to no fault in the babies, but is the outcome of the conditions to which they are exposed, is tantamount to asserting that many infants' deaths are preventable. How can they be prevented? It does not seem that much is to be expected from improved sanitary conditions. Improvements in sanitation have resulted in a great diminution in the incidence of certain infectious diseases. Typhus has practically disappeared. Cholera has disappeared. Typhoid fever has been greatly reduced. Owing to vaccination, smallpox is almost unknown, except for occasional outbreaks in unprotected localities. But such improvements have affected the infantile mortality to only a very small extent. Evidently something more is wanted. The something more would seem to be nothing more unattainable than a means of ensuring that the babies should be kept clean and warm and comfortable; that they should, if possible, be nursed by their mothers; and that if they fall ill medical advice should be sought at once. For infants whose mothers cannot nurse them there should be available a supply of milk whose purity and cleanliness is guaranteed, and which is diluted and otherwise modified to suit the digestive capacity of the individual infant.

These requirements might be fulfilled by three agencies —education, municipal godmothers, and municipal milk depots.

(*a*) *Education.*—There can be no doubt that the proper person to look after the baby is the baby's own mother. But, unfortunately, the baby's mother is often very badly equipped for the task, and the baby suffers in consequence. The obvious remedy is that girls, before they leave school, should be taught in a thoroughly practical manner something of household management, elementary hygiene, and the management and care of young children. This teaching should aim at fitting the girls for the duties they will have to undertake when they have homes of their own. It ought, let me repeat, to be thoroughly practical, so that we may no longer hear of girls who know that fire will not burn without oxygen, but who are unable to lay a grate or boil a kettle; who know the composition of various foods, but have no idea that potato soup is unwholesome for young babies.

(*b*) *Municipal Godmothers.*—To Mr. Broadbent, ex-Mayor of Huddersfield, is due the great credit of initiating a scheme which I venture to designate in this way. Mr. Broadbent offered to pay £1 to each baby born within a district of Huddersfield (Longwood) on its completing the age of one year. The promise was made by means of a promissory note printed on a card, on which was given also much good counsel. By means of the card lady health visitors, who were appointed by the Corporation, obtained admission to the homes, and paid visits periodically, keeping a kindly eye upon the babies, and helping the mothers with advice and sympathy. It was a rule that the visitors should not administer charity. In carrying out such a scheme it is evident that much must depend upon the knowledge, sympathy, and tact of the lady visitors, and that even amongst those most in need of supervision there will be many who will resent the visits of the ladies as an unwarrantable intrusion. No doubt it is just here that Mr. Broadbent's pound became useful, for if it was looked upon as a prize, it is obvious that competitors must submit to the conditions imposed, even if those conditions included lady visitors for the mothers and an unusually monotonous diet for the babies.

This experiment has now been carried on sufficiently long to show that the results fully justified the trouble taken. The number of babies who received one of Mr. Broadbent's cards was 112, and of these 107 actually received the gift of £1 on attaining the age of one year. This works out at a mortality of 44 per 1,000, whereas the infantile mortality for Longwood has averaged 122 for the last ten years. A Huddersfield and District Public Health Union has now been organized to carry out the same system in other parts of Huddersfield. It seems quite evident that the scheme has great possibilities for good, and it is to be hoped that similar experiments will be tried in other towns. Such an experiment might be begun by supervising for a year after birth the babies who are born in maternity hospitals. Illegitimate children, and *all* children who are under the charge of other persons than their parents, should be specially supervised. It is well known that the death-rate amongst illegitimate children is abnormally high. The scandals of baby-farming which from time to time are exposed in the newspapers show conclusively the imperative call for a law forbidding anyone to take charge of an infant for hire without being licensed, and subject to the visits of an inspector.

(*c*) *Municipal Milk Depots*.—There can be no doubt that a baby who is nursed by its mother has a far better chance of surviving and growing strong and healthy than one who is artificially fed, even by the most scientific methods. Unfortunately, there are many women who, for various reasons, are unable to nurse their offspring. For the sake of such babies, and for the sake also of older children in whose diet milk holds an important place, the local authorities ought to supervise the milk supply, and guarantee that the milk when it reaches the customer is clean, pure, and fresh. 'Public milk supplies,' said Professor Sedgwick thirteen years ago, 'may not be legally watered, but they may be stale, of polluted, or infected,' and the same statement might be repeated to-day. A very large proportion of the milk which is supplied in this country is obtained from cows whose freedom from disease is not guaranteed by efficient inspection. The milking is carried out under conditions which are often indescribably filthy. Between the cow and the customer the milk is exposed to frequent risk of contamination, and when at last the milk is sold it may be in the incipient stages of putrefaction.

That a great deal of the sickness and mortality among infants and young children is due to impure and stale milk is quite certain. It has also been conclusively shown again and again, both by municipalities and by private enterprise, that our present knowledge is quite adequate to supply a remedy. As an example of what may be done by private enterprise, let me quote the experience of the Hon. Nathan Straus, whose name has been associated for some years with the spread of milk depots in New York. These depots supply pure Pasteurized milk at a low price, and it is claimed that the quality of the milk is so much appreciated by the customers that a considerable improvement has resulted in the milk sold by the ordinary milk dealers. In 1893, the year before the service of the milk depots was on a sufficiently large scale to be a recognizable element in the milk supply of New York, the death-rate of children under five was 89·3 per 1,000. By 1897 the mortality had fallen to 69·2 per 1,000. Since then it has continued to fall somewhat irregularly, the lowest figure being reached in 1903, when the rate fell to 54·8 per 1,000. For the quinquennial period 1891-5 the rate was 90·6; for the five years 1900-4 it was 61·2, a reduction of 32·4 per cent. Mr. Straus states that in the ten years during which his milk depots have been fully equipped and organized there has been effected a saving of not less than 6,982 infant lives per annum, and claims for his Pasteurized milk supply the chief credit of this saving.

The subject of municipal milk depots opens up far-reaching political and social questions which cannot be discussed here. But it is obvious that authorities which enforce strict regulations regarding the shops in which milk is sold, and which punish the watering of milk, cannot logically stop short of forbidding the sale within their limits of milk over whose source and previous treatment they have no control.

THE HEALTH OF CHILDREN BETWEEN ONE AND FIVE.

The health of young children undergoes a progressive improvement from the first year onwards. Of the children attending as medical out-patients at the Sick Children's Hospital, Edinburgh, I find that 27·5 per cent. are under one year of age; 19·5 per cent. are in their second year; 11·3 per cent. in their third year; 8·9 per cent. in their fourth year; and 6 per cent. in their fifth year.

Among children in their second and third years digestive troubles continue to predominate. In many cases these owe their origin to improper feeding in the first year. In the second year of life 33·9 per cent., and in the third year 33·5 per cent., of the children attending were suffering from digestive disorders. To these should be added the cases recorded as rickets, a disease of nutrition depending mainly on improper feeding. Rickets is in its ascendancy during the second year. Among infants under one year of age rickets is recorded as the diagnosis in 12 per cent.; among children in their second year, in 27·4 per cent.; in the third year, in 21 per cent.; and in the fourth year, in 10 per cent. These figures understate the proportion of rachitic children, because in many cases treated for bronchitis, diarrhœa, or other ailments rickets was present, but was not entered in the diagnosis.

The question of the age at which children should go to school is obviously important in relation to health, and the proposal of the Board of Education to exclude children between the ages of three and five, or to reduce the grants on such children, has raised a good deal of discussion. I personally think that the age of six is quite young enough for any child to be sent to school, but I admit that some provision should be made for young children whose home life is unsatisfactory.

Some little time ago the Manchester Branch of the British Child-Study Association had this question under discussion, and unanimously passed a resolution in favour of sending children between the ages of three and five to school. This was advised, firstly, on hygienic grounds, it being asserted that the children benefited by the enforced cleanliness and regular and decent habits rendered necessary by attendance at school, that their health and nutrition were under supervision, and that the manner in which they were taught obviated mental and physical strain. Secondly, on educational grounds it was stated that children between three and five are at a very impressionable age, that they need outlets for their activity, training in good habits, and varied occupation, such as very few of their homes can provide.

The other side of the question is well illustrated in a paper on 'Reform in Infant Schools,'[1] in which the author quotes from a report of six women inspectors appointed by the Board of Education to inquire into the actual condition of these children in schools. What struck these inspectors most in the course of their work was the difference between the children in and out of school. School

[1] *Paidologist*, July, 1906.

meant for the children overcrowding, bad ventilation, cramped postures, unsuitable seats and desks, restriction of play, the imposition of unnatural silence, and long hours of sitting still. Exclusion of sunlight is particularly referred to. 'Thousands of children belonging to an Empire on which the sun never sets are condemned to spend their school-days in rooms where the sun never shines.'

As to overcrowding, a voluntary school is referred to where, 'in a babies' room, built, the teacher thought, for 50—the gallery would seat 50—the average attendance during a large part of the year was over 90. Last summer the numbers rose to 100, 110, 120, and on one terrible afternoon there were 132 in attendance.'

Surely to be offered a choice between the worst conditions at home and conditions such as these at school is to be asked to choose between the devil and the deep sea! The present condition of the infant departments of the elementary schools calls for something more than reform. It calls for revolution. The only institution which seems to meet the needs of young children who cannot be or who are not properly taught and looked after at home is the kindergarten. But the kindergarten must be a real kindergarten. It must have a building of its own, and, above all, a garden. It must have abundance of space for the children to run about and play. The teachers must be thoroughly trained in kindergarten methods, and must understand the philosophy as well as the practical working of the system. The teachers, moreover, must not be expected to take charge of an impossible number of children. The younger children are, the more necessary is individual attention and care, and the smaller, therefore, ought classes to be.

The Health of School-Children.

While the rate of mortality diminishes greatly after the school age, ill-health continues to be very prevalent. In most civilized countries investigations have been made in recent years into the health of the school population, and the results have uniformly been found to be of a disquieting nature. The latest investigation of this kind on a large scale was undertaken at the instance of the Royal Commission on Physical Training in Scotland, whose report was published in 1903. A medical examination of school-children was made in the public schools of Edinburgh and Aberdeen, 600 children being examined in each city. From this report it appears that disease or defect of some sort was present in no less than 45 per cent. of the Aberdeen children examined, and in as much as 70·5 per cent. of the children examined in Edinburgh. Children suffering from active phthisis were found attending school, and children with heart disease were discovered taking part in physical exercises which could not but aggravate the ailment. At the same time, it must be remembered, in comparing these figures with statistics collected elsewhere, that the schools examined included those attended by the poorest and worst-cared-for children, and that the term 'disease' includes any minor ailments which were discovered. But when all such allowances are made, the fact remains that in Scotland, as elsewhere, the health and nutrition of a very large proportion of the school population are in a most unsatisfactory condition.

That the home conditions are responsible to a considerable extent for this sad state of affairs is shown by the following considerations: All the school buildings, both in Edinburgh and Aberdeen, were at least fair in respect of plan, ventilation, heating, etc., so that the manner in which each school influenced the condition of the children differed but little. It was otherwise, however, with the houses where the children resided. Of the Edinburgh children, 45 per cent. lived in very small (one or two-roomed) houses. In Aberdeen, on the other hand, the social status of the children was higher, and the housing conditions were more satisfactory. 'The ratio of health in both cities harmonizes with those facts. Thus, there are among all the children examined in Aberdeen 0·5 per cent. in apparent poor health, while in Edinburgh there are 19·17 per cent.'

While a good deal of the ill-health of school-children is due to existing home conditions, the schools themselves must bear at least a part of the blame. The following conditions deserve special consideration.

1. *School Hygiene.*—The buildings used for educational purposes are frequently very unsatisfactory. An examination of non-provided schools in London was recently made by the Education Committee,[1] and of 438 schools, no less than 92 were reported as wholly unsuitable, while the drains were found to be faulty in 78 per cent. There is no reason to believe that things are better in other parts of England. Recent Congresses on the subject of school hygiene have shown that there is now substantial agreement among experts as to the best methods of building schools, of arranging class-rooms, and of warming, lighting, and ventilating them. Failure on the part of many schools to meet our present knowledge of hygiene, whether from penuriousness or apathy, must be placed first among the ways in which schools injure health.

2. *The Spread of Infectious Disease.*—It is well known that schools are very largely responsible for the spread of infectious disease. This is particularly true with regard

[1] *Brit. Med. Journ.*, April 22, 1905.

to measles. This disease is most infectious in its early stages, before the appearance of the rash. The consequence is that children are often at school for a day or two, spreading infection among their companions, before the affection is recognized. The spread is very much affected by the hygienic conditions of the schools. It is much less where there are large, airy class-rooms than where the rooms are close and crowded.

The way in which measles spreads has been very carefully studied in the schools of Woolwich, under the supervision of Dr. Kerr, Medical Officer to the London School Board. Dr. Kerr points out that much can be effected by an intelligent mistress, with hygienic instincts and training, to protect even babies' classes. He suggests that whenever a case of measles appears in a class, circulars should be sent to the mothers of unprotected children asking them to look out for colds, and on the slightest appearance of symptoms to keep the child at home for a few days till the nature of the case is clear.

For the spread of scarlet fever, diphtheria, whooping-cough, chicken-pox, and mumps schools are more or less responsible. All day-schools should keep a health register of each pupil, showing what infectious diseases have been experienced. The schools should be in touch with the public health authorities, so that teachers may know what infectious diseases are present in the district. The teachers also should have sufficient knowledge of the symptoms of the common infectious ailments to enable them to send home any suspicious case.

3. *The Teacher's Knowledge of Hygiene.*—Teachers should also have a practical knowledge of the hygiene of childhood. With the best systems of warming and ventilation, it yet rests with the teacher to see that the class-room is flushed with fresh air between lessons. The most ideal seats and

desks are useless unless the teacher sees that they are adapted to the individual child; and when that has been done, the teacher has still to see that the correct attitude, which the desk and seat make possible, is really assumed by the child. The teacher should understand the danger of eye-strain, and be able to ascertain whether the lighting in all parts of the class-room is sufficient. He should be able to test the eye-sight and hearing of his pupils—at least, to the extent of being able to gauge their efficiency for school purposes. He should have sufficient knowledge and sufficient power of observation to note any ill-effect which the school-work is having upon the children. He should be thoroughly acquainted with the signs of fatigue. He should be able to recognize when laziness results from ill-health, unruliness from want of outdoor exercise, and stupidity from the possible existence of adenoids.

4. *School-Work.*—That the hours usually allotted to school-work (work at home and in school) are much too long, from the hygienic point of view, there can be no reasonable doubt. Even from the point of view of mental attainment, the prevalent plan of working children morning, noon, and night, often to the verge of exhaustion, and then giving them an eight or ten weeks' holiday to recuperate, is unsatisfactory. The work done at experimental schools, both in this country and in America, seems to show that, with good teaching, children working half the usual school-hours make quite as rapid and satisfactory progress as children in an ordinary school. More work of this kind is needed, however, before one can safely dogmatize as to the number of hours which should be allotted for the school-work of children of different ages.

5. *Worry, Excitement, Fatigue, etc.*—Certain mental conditions have a very important bearing on the question of

health at school, and in these days, when the so-called nervous diathesis is increasing among us, there must be few physicians who do not occasionally see children who have a perfect genius for worrying, and whose health rapidly suffers under the excitement of school-life, even to the extent of necessitating removal from school altogether. A minor degree of interference with health from this cause is extremely common in children who, probably, never come under the doctor's notice at all. Suffering of this kind certainly depends very largely upon a predisposition on the part of the child. Nevertheless, the responsibility rests with the school authorities of seeing that the conditions at school are not favourable to its development. Among the factors productive of worry in children, perhaps the most important is the personality of the teacher. A fussy, or excitable, or nervous teacher will greatly increase the nervous wear and tear among the children. Few things tire children more effectually than a teacher with a nervous manner. Among other potent causes of worry *in particular instances* may be mentioned rewards and punishments, the system of class marks, examinations, the discipline of the class-room, unnecessary or too prolonged restraint, and certain methods of teaching. The effect of all these upon the children individually requires to be closely watched.

6. *The Health of Girls as compared with Boys.*—There seems to be no reason for believing that girls are naturally more delicate than boys. Newsholme, in his *Vital Statistics,* tells us that in the years 1891-95 female mortality was lower than male mortality at all ages except five to twenty, and only between ten and fifteen was the female slightly higher than the male mortality.

Mortality rate, however, does not necessarily correspond to sickness rate, and I have thought it might be of interest to compare the numbers of the two sexes coming to the Hospital for Sick Children in Edinburgh. I have added separately the children of school age, and those under school age, attending during a certain period. The figures are as follows:

Under six years of age: Boys, 2,136; girls, 2,079.
Between six and twelve years of age: Boys, 550; girls, 630.

So far as these figures go, girls seem to be, if anything, slightly more healthy than boys before the school period, while during the school period illness is decidedly more common among girls. An examination of the sickness rate, therefore, appears to corroborate what we find on examining the mortality rate — namely, that girls are naturally, and remain during the first few years of life, quite as healthy as their brothers. During the school period, however, some influence is at work whereby both the sickness rate and the mortality rate increase until they surpass the corresponding rate among boys.

When we compare the life of the average schoolgirl with that of the boy, it is not difficult to lay one's finger on the probable cause of this deterioration in the health of the girls. Boys, as a rule, have a great deal of outdoor physical exercise. In many boys' schools outdoor games are not only encouraged, but are compulsory. The result is that in many cases schools are able to do more than disclaim injury to the health of their pupils. They can point to many instances where health has actually been improved. But in this respect girls' schools have been much behind schools for boys. Boarding-schools have been the worst offenders. Seminaries for young ladies have in too many instances regarded a daily walk *en crocodile* as supplying all that a girl ought to require in the way of fresh air and exercise. Underfeeding has also been common, and girls have been encouraged in the idea that a hearty appetite is unladylike.

Now, it cannot be too strongly impressed upon parents and teachers alike that outdoor exercise is every bit as important for girls as for boys. Without it girls cannot but grow up weakly and anæmic. The culture of the body is just as important as the culture of the mind, because it is important to the culture of the mind. A sound mind depends upon a sound brain, and a sound brain upon a sound body. For healthy mental development healthy bodily development is a prerequisite.

During certain periods of a girl's life special care is necessary. During the early school period, for example, it should be remembered that girls are more liable than boys to functional nervous affections, and therefore require to be more carefully guarded from the effects of worry, excitement, and fatigue. Competition seems to be more harmful to girls than to boys.

The period which requires most care, however, is that of puberty. The rapid development which takes place at this time seems to be a great drain upon the energy of the girl. The marked acceleration in the rate of increase in muscular strength and endurance which takes place in boys after puberty scarcely occurs in girls at all. Expenditure of energy and fatigue, which mean little to the boy, are serious matters for the girl.

Guided solely by their experience, many practical teachers are asking whether during the period of rapid development at puberty the mental work expected of girls ought not for a time to be diminished instead of increased. Stanley Hall, doubtless, goes too far in suggesting—of course, he is thinking of American and not of English girls—that 'idleness should be cultivated and reverie should be provided for in every way'; but I believe that there is physiological justification for a difference in the treatment of girls and of boys upon the lines indicated. The need for some relaxation of the pressure of school-work is, of course, particularly great at certain times. By the exercise of a little forethought in the arrangement of the work, and by giving out such work as essays to be done by the girls themselves some little time in advance, it should be possible to accomplish the end in view without embarrassment of the pupils.

CHAPTER XI

FATIGUE

'But the children began to be sorely weary; and they cried out unto Him that loveth pilgrims to make the way more comfortable.' —*Pilgrim's Progress.*

It is a common experience that the unforeseen and the unexpected awaken interest and compel attention in a manner which the familiar fails to do. Hence it is that common things often receive much less study and attention than they deserve. Fatigue must be reckoned amongst the common phenomena of life which have suffered in this way. If after prolonged exertion we did *not* feel tired we should certainly feel surprised; but that fatigue should follow toil is just one of those facts which are too familiar to excite remark or question. Hence it is that the literature of fatigue, especially in English, is remarkably scanty. For one paper upon fatigue it would be easy to find a score on myxœdema, or a hundred dealing with radio-activity.

The scantiness of the literature is, of course, no indication that the subject is of trivial importance. The contrary is, in fact, the case; and all who are engaged in the task of educating the young should be acquainted with the physiology of fatigue in its bearing on school-work, and should be able to recognize the earliest symptoms of overstrain in their pupils.

Knowledge of this kind is becoming more than ever important. The hurry and bustle of modern life, the exactions of business, the excitement of competition, and the increasing concentration of the population in large centres, all combine to throw a strain on the nervous system of the modern man which was unknown to his forefathers who lived in quieter days. These various conditions are not only provocative of nervous affections of various kinds amongst the parents, but they enter into the environment of the children, and produce an atmosphere in their home and school life which favours the production of nervous strain. At the same time the extraordinary advance in our knowledge of the world about us, of the forces at work in it, and of the laws by which it is governed, necessitate a wider curriculum and a more thorough training if the children are to enter into their heritage. For the modern child there is far more to be learned than for the child of a hundred years ago. The task of the educator is correspondingly more difficult, and if he is to succeed in his task it is essential, not only that he should have a definite conception of the end to be attained, but that his curriculum and his methods of education should be adapted to the laws which govern mental and bodily development. Whatever is to be said in favour of the medieval curriculum still prevalent in a majority of our schools, it is quite certain that the attempt to fit children for modern life by patchy additions to that curriculum is foredoomed to failure.

Symptoms of Fatigue.

The symptoms of fatigue are not confined to the subjective sensation of weariness. A person fatigued by either bodily or mental exertion acquires a tired look, his movements become less active, his conversation less lively. He is disinclined for exertion of any kind, and has a tendency to fall asleep. The child tired by play may fall asleep amongst his toys; the soldier, exhausted in battle, may sleep amidst the roar of guns.

The symptoms of fatigue are *primarily* associated with the part of the body which has been specially exercised, but when the fatigue is severe and approaches exhaustion the symptoms are of a more general nature. Thus it is that, after a long walk, we seek recreation in conversation or in reading light literature; but the fact that the fatigue is not confined to our muscles is shown by our disinclination for work involving concentration of thought. After prolonged mental exertion, on the other hand, we find refreshment in gentle outdoor exercise, but anything involving severe bodily effort would simply add to our fatigue. That fatigue, however produced, tends to become general is also shown by the fact that the memory is often affected by severe exertion, so that men who have succeeded with great difficulty in climbing a mountain may find, after descending, that they have completely forgotten all the details of the ascent. Again, it is well known that it is unwise for a man who is much fatigued to indulge in a heavy meal. If a young man who has not been taking much exercise goes for a long day's tramp at the beginning of his holidays, and then has a very good dinner before going to bed, it will not be an unusual circumstance if he is awakened by sickness during the night. Indeed, when we are much exhausted, Nature warns us to be sparing in eating by taking away our appetite until we have had some sleep.

Under certain circumstances fatigue seems to become chronic. There are some people who are always tired. Others are always sleepy in the morning and languid all forenoon, though they may feel brighter and more active in the afternoon or evening. Fatigue of this kind is not uncommon amongst school-children, and as it indicates a state of nervous exhaustion which may readily be increased even to the occurrence of illness, it is obviously important that the danger-signals should not pass unobserved.

Children suffering from this chronic fatigue have frequently a wearied expression. The forehead is apt to be furrowed horizontally; the eyes appear somewhat sunken, and there may be a bluish discoloration beneath them; the pupils are usually large, and the movements of the eyes are sluggish; there is a want of alertness and interest in the expression. The bodily movements are wanting in grace; they may be slow and awkward, or may be quick and jerky in character, but at the same time lacking in precision. Slight twitching is not uncommon, and may be noticed at the angle of the mouth or in the fingers.

This last symptom indicates a degree of nervous irritability which is likely to be associated with disturbed and restless sleep at night. During sleep it is common for the child to grind his teeth, and he may be awakened by bad dreams or 'night terrors.' His temper is apt to suffer, and he becomes abnormally cross and irritable, and frequently suffers from headache.

The general health also suffers. The appetite is capricious or bad, and the nutrition is below par.

For a time the school-work may be done satisfactorily enough; nevertheless, the children have really great difficulty in paying attention to their tasks, their memory is impaired, and there is a want of mental grip. But a conscientious child often becomes even abnormally anxious about his lessons, and will spend hours trying to master what ought to be learned with no difficulty at all. In this way the fatigue becomes exaggerated, while the teacher is blinded to the danger-signals owing to the class-work being fairly well done. The child himself at this stage may make but little complaint; indeed, after a certain point has been passed, he scarcely seems to feel his own fatigue: he is too weary to do so.

FATIGUE AND OVERPRESSURE.

The symptoms just referred to, which are commonly spoken of as those of overpressure, apparently indicate something more than simple fatigue.

Fatigue, from the physiological point of view, may be regarded as a form of poisoning by the waste products generated in the tissues during their activity. The technical term applied to such a condition is auto-intoxication, or self-poisoning. The proof of this is furnished by experiments. If a frog is killed and a muscle removed from the body, it is found that contractility persists for a considerable time. To study the phenomena of fatigue, the muscle is suspended by one extremity, while a small weight is attached to the other. If the muscle is now stimulated by an electric shock, it will contract and lift the weight. The amount of contraction may be registered by means of a small lever which is lifted by the muscle, and which records its movement upon a piece of smoked paper. Shocks are imparted to the muscle at regular intervals, say every second, and as fatigue sets in the contractions become slighter and slighter, until they cease. Now, it has been found that if the muscle is thoroughly washed by passing a stream of weak salt-and-water through the bloodvessels—pure water being a poison to muscle—the fatigue products are removed, and the muscle again becomes responsive to the stimulus.

Another proof has been supplied by Professor Mosso, who found that if he withdrew some blood from a dog in an exhausted condition and injected it into a fresh and lively animal, the latter immediately began to show signs of fatigue.

In the condition called overpressure fatigue is present, but, in addition to the poisoning, there is an exhaustion of the nervous energy. All the functions of the body are presided over and regulated by the nervous system. Not only those functions of which we are conscious, such as movement and sensation, but those of which in normal circumstances we are unconscious or practically unconscious, such as digestion and circulation, are under nervous control, and involve an expenditure of nervous force. In a condition of health the amount of nervous energy at our command is so great that the nervous system readily meets any sudden extra demand such as is required for bodily or mental exercise. Within certain limits such a demand produces a degree of fatigue which is not only harmless and quickly recovered from, but which is actually helpful. Function makes structure, the physiologists say. The energy of growth tends to manifest itself most in those parts which are most exercised. But if the physiological limits are passed, if there is too great a withdrawal of nervous energy, recovery may fail to take place readily, and more or less lasting damage is done. We are not quite certain what the physiological explanation of this fact is, but it is probable that it depends upon serious injury to some of the nerve cells, which form the centres from which the nervous energy radiates. It is known that certain kinds of paralysis which tend to begin in muscles which have been greatly overexercised in some special occupations are due to degenerative changes in the nerve cells in the spinal cord, and in cases where the brain is overwrought the cells of the cortex may, in a similar way, be so severely injured that they can recover only after prolonged rest, or perhaps may not recover at all. It is, however, still an open question how far such damage results directly from exhaustion on the one hand, or from the action of the poisonous fatigue products on the other.

CAUSES OF NERVOUS EXHAUSTION.

1. *Heredity.*—There can be no doubt that people differ a good deal in the amount of their congenital endowment of nervous energy. An amount of wear and tear which produces only healthy fatigue in one case will result in aggravated brain fag in another. People differ also in the kind of work for which they are fitted. There are plenty of people who are quite healthy, active, and intelligent, who take kindly to all sorts of practical pursuits, but who do not seem to have been intended by Nature for those interests which constitute the higher forms of culture. The attempt to force such people into a mould which they were never meant to fill can scarcely fail to result in damage to the nervous system, and when our school curricula are more scientifically based than at present we shall not expect any curriculum to fit all children alike.

2. *Poor Feeding.*—It goes without saying that nervous energy must come from somewhere. The somewhere is, in this case, the food which is assimilated by the child. If the child is not supplied with sufficient food, or if he is not supplied with suitable food, or if the appetite to consume the food be wanting, the nutrition of the body, including the nutrition of the nervous system, must suffer. Unfortunately, children in this condition are apt to have very poor appetites. More than half the children who go to school breakfastless do so, not because there is no

breakfast for them, but because they have no appetite to eat it. Many of these children take their food well enough when not attending school. Thus the school robs them of their appetite, and their want of appetite makes them unfit for school.

3. *Unhygienic Surroundings.*—Unhealthy surroundings at home naturally aggravate the struggle, and at school also overcrowded and badly ventilated class-rooms may be quite as much to blame for the condition of the children as the actual brain-work which has to be done.

These three conditions, singly or combined, act as predisposing causes, producing a condition of malnutrition which scarcely stops short of actual ill-health. Few things are more amazing than the amount of vitality and go possessed by healthy and well-nourished young children, but the lack of energy and initiative amongst the less favoured of the children of the poor is but little less striking.

4. *Insufficient Sleep.*—Sleep is the great restorer, and is no less important to the child than food itself. The young infant spends almost its whole time in sleep. During childhood and youth the number of hours of sleep gradually decreases until adult age is reached, but all authorities are agreed that till growth is completed long hours of sleep are necessary.

Dr. T. D. Acland has recently drawn attention to the fact that in many of the public schools the hours of sleep are insufficient. His attention was directed to the subject by a definite case in which it was evident that short hours of sleep were doing harm. In order to ascertain the facts as completely as possible, he made inquiries as to the approximate hours of quiet in the dormitories in forty of the great English schools, and in five of the largest and best schools in America. The result of these inquiries was to show that only five of the forty English schools came up to the highest standard, while in all five of the American schools the approved hours are given to the younger boys—namely, nine and a half to ten hours' sleep. In no less than twelve of the most important English schools one or more of the medical officers were of opinion that the younger boys needed more sleep than they could at present obtain.

Sir James Crichton-Browne, writer of the Government Report on *Overpressure in Elementary Schools*, has written and spoken strongly of the necessity of sufficient sleep for growing children. He regards insufficient sleep as a very important factor in the production of various nervous disorders, and of the symptoms of overpressure. He has also drawn attention to the very important fact that when a growing child is suffering from lack of repose, or from overstrain of the nervous system, the ill-effects are not always obvious at the time, but are seen later; and, indeed, it has been observed by many that unusually bright and clever boys who are pushed on rapidly at school are often never heard of afterwards.

Dr. Dukes, the medical officer of Rugby, is another authority who has for many years warmly advocated the claims of sleep, and I quote his table of the hours of sleep desirable (p. 181).

It is not sufficient that the time allowed for sleep should be long enough: it should also be quiet. Young children, whether at home or at school, should not be disturbed unnecessarily by others coming to bed. Moreover, children should be trained to go to bed and sleep at the proper time. Children who require to be wakened out of sound sleep in the morning often feel wide awake at bed-time, and want to talk and play, but this only shows the necessity of proper training. Going to sleep at a particular time is very much of a habit, and the forming of habits is apt to be a little troublesome.

One other point with regard to the sleeping-room may be mentioned, that is, that it should be darkened. Light sleepers are often unable to sleep at all except in the dark, and those who can sleep in a light room are not likely to sleep soundly. If, therefore, care is not taken to secure darkness, children are likely, during summer, to awaken very early, or to secure a less profound sleep than they ought.

DR. DUKE'S TABLE OF THE AMOUNT OF SLEEP REQUIRED AT VARIOUS SCHOOL AGES.[1]

Under 6 years	13 hours.
„ 7 „	12½ „
„ 8 „	12 „
„ 9 „	11½ „
„ 10 „	11 „
„ 13 „	10½ „
„ 15 „	10 „
„ 17 „	9½ „
„ 19 „	9 „

5. *Too Long Periods of Lessons and Too Many Hours of Work.*—In considering fatigue in relation to school-work we have to take into account both the length of the individual lessons and the total amount of time devoted to school-work. Young children can fix their attention on any one subject only for a very short period, and for them very short lesson periods should alternate with exercise or play. Investigations seem to show that—

At 6 years	the attention can be fixed for	15 minutes.
At 7 to 10 years	„ „ „	20 „
At 10 to 12 „	„ „ „	25 „
At 12 to 14 „	„ „ „	30 „

[1] *Health at School*; Rivingtons, 1905.

If lessons last longer than the periods mentioned, the time will not be fruitfully occupied, but, on the contrary, the children will be apt to form habits of idleness and inattention—safeguards, in a measure, against fatigue.

As regards the total amount of work which should be sufficient for children, I may again quote Dr. Dukes:

TABLE OF SCALE OF WORK FOR SCHOOLS.

From 5 to 6 years of age	-	-	6 hours per week.
„ 6 to 7 „	-	-	9 „ „
„ 7 to 8 „	-	-	12 „ „
„ 8 to 9 „	-	-	15 „ „
„ 9 to 10 „	-	-	18 „ „
„ 10 to 11 „	-	-	21 „ „
„ 11 to 12 „	-	-	25 „ „
„ 12 to 14 „	-	-	30 „ „
„ 14 to 15 „	-	-	35 „ „
„ 15 to 16 „	-	-	40 „ „

6. *Worry or excitement*, such as may result from various school conditions, may play a very important part in producing the symptoms of overpressure.

THE SCIENTIFIC INVESTIGATION OF FATIGUE.

For the purpose of studying fatigue in the human subject Professor Mosso[1] of Turin has invented an ingenious instrument which is termed the ergograph. This consists of a metal stand with two padded metal clamps. The forearm of the subject is placed upon the stand and fixed by the clamps, one of which embraces it near the elbow, the other at the wrist. The forefinger and the ring-finger are thrust each into a brass tube. The forearm and the two fingers mentioned are thus rendered immobile. The middle finger, however, is free to move. To it, by means of a leather loop, is attached a string. The string

[1] *Fatigue*, by A. Mosso, trans. Drummond; Sonnenschein, 1904.

passes over a pulley at the end of the table on which the instrument rests, and to the free end of the string is attached a weight, usually of 2 or 3 kilogrammes. The work to be done consists in raising the weight again and again by flexing the middle finger. An important point is that, as the finger becomes fatigued, it is not able to obtain assistance by auxiliary movements. It is for this

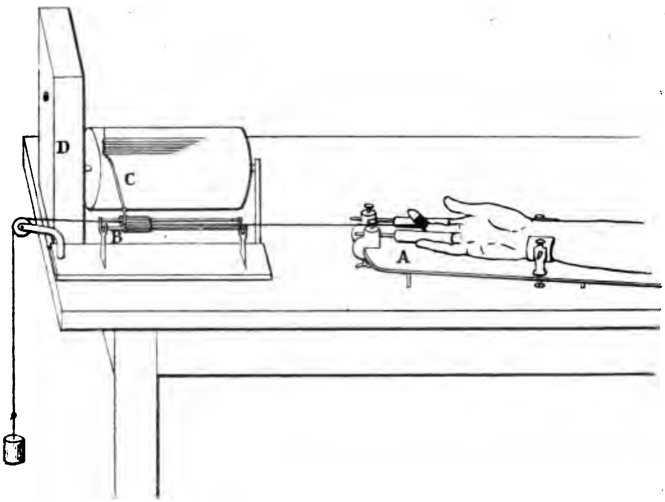


FIG. 2.—SKETCH OF THE ERGOGRAPH.

A, Support for forearm; B, carrier of style, sliding on two metal rods; C, style writing upon a revolving drum; D, clockwork for drum.

reason that the elbow, the wrist, and the fingers on either side of the active one are immobilized.

In order to obtain a graphic record of the movements made by the finger, a little style is attached to the string, and the free end of this rests lightly upon a horizontal metal drum or cylinder which has been covered with smoked paper. Whenever the weight is lifted by the finger, the style, drawn along by the movement of the string, makes a mark upon the paper, and as the drum is made to revolve at a slow rate by means of clockwork, the successive movements of the finger are recorded on the paper by a series of successive strokes, the length of each of which corresponds to the amount of the corresponding movement.

The subject of the experiment, after having his arm fixed and the apparatus arranged, lifts the weight as high as he is able every two seconds, the time being marked by

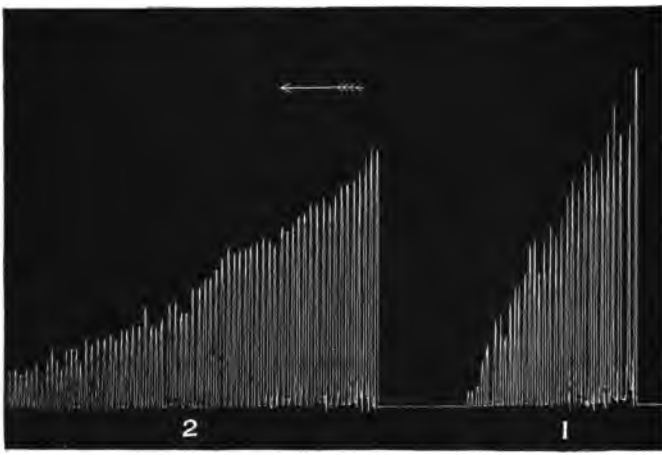


FIG. 3.—ERGOGRAPHIC TRACINGS: READ FROM RIGHT TO LEFT.
Weight of 3 kilogrammes raised by the finger every two seconds.
1, Rapid; 2, gradual fatigue.

a metronome. At first the weight can be lifted quite easily to the full extent of the flexion of the finger, but as fatigue sets in the amount of movement becomes less and less, until at last the weight cannot be lifted at all.

It will now be found that the smoked paper is marked by a series of vertical lines which more or less gradually diminish in size from one end of the series to the other, until at last they die out altogether. Such a series constitutes a fatigue tracing. If a line is drawn joining the upper end of all the lines in the series it will be found to form a curve, the curve of fatigue.

During recent years a very great many experiments have been carried out by means of the ergograph or some modification of it. Amongst observers who have devoted themselves with special zeal and enthusiasm to ergographic work I may mention as next to Professor Mosso himself Dr. Treves of Turin and Mlle. Joteyko of Brussels.

It will be possible to mention only a very few of the facts which have been discovered by means of the ergograph.

FIG. 4.—MYOGRAPHIC TRACING: READ FROM RIGHT TO LEFT. Muscle removed from body, suspended with a weight at one end, and stimulated by successive electric shocks.

The first fact of importance to be noted is that the curve of fatigue is—a curve. When a muscle removed from the body is fatigued by successive electric shocks in the manner I have already described, it is found that successive contractions diminish by regular amounts, so that when the upper ends of the strokes on the tracing are joined we obtain not a curve, but a straight line. This indicates that voluntary must differ from involuntary fatigue.

Moreover, the curve of voluntary fatigue differs with the individual. Sometimes the successive strokes show very little diminution for a considerable period, and then fatigue seems to come on rapidly, resulting in a sudden fall of the nerve. In other cases the curve may begin to fall very soon, but continue to fall quite gradually, so that a considerable time may elapse before complete exhaustion is reached. According to Professor Mosso, each individual has his own characteristic type of curve. He has kept fatigue tracings of some of his colleagues taken at intervals over a number of years, and very often a curve taken to-day is found to be the counterpart of a tracing made some years ago. Professor Mosso draws attention to the fact that in ordinary life, also, different types of fatigue may be made out, and he instances Darwin, who would work on steadily for some hours and then suddenly stop, perhaps in the middle of a sentence, saying, 'I believe I can do no more now.'

It may be thought that this method of study is applicable only to muscular fatigue, but this is not so. By victimizing his colleagues before and after the fatigue of conducting some tedious examination, or some new professor before and after the strain and excitement of delivering an inaugural address before a large audience, Professor Mosso was able to show that the fatigue incurred affects the tracing very plainly. The successive strokes on the second of the pair of tracings are both shorter and fewer in number than on the first. Moreover, this difference is not due, or, at any rate, is not wholly due to the brain fatigue, and to the inability of the subject to pay the strict attention or to make the effort required. For it was found that if the tracings were obtained by applying an electric current to the nerve supplying the muscle, similar differences were present.

Some very interesting experiments have been carried out by Dr. Treves with the object of discovering how the greatest amount of work could be got out of his muscles. He used a modification of the ergograph, in which the work was done by bending the elbow. He began by using a heavy weight, and whenever this failed to be lifted above a certain height his assistant substituted a lighter one. As soon as this also ceased to be lifted sufficiently high a still lighter weight was put in its place. The weights and heights were arranged so that with each substitution the amount of work done was raised above that to which it had fallen, the lighter weights being lifted to a greater height. Dr. Treves found that when the weight fell to a certain number of kilogrammes fatigue no longer appeared in the tracing. His arm could raise the weight to the full height every two seconds, and go on doing so practically indefinitely. At this stage evidently the energy expended on each contraction of the muscle was made good during the short pause which followed. This is what occurs normally in the beating of the heart. In many kinds of manual work in factories and elsewhere a similar condition of equilibrium must exist between the energy of the workers and the amount of work done. Where work admits of being done rhythmically, the workers are likely to find out that they can do a larger amount of work by proceeding at a certain steady pace rather than by spurts of energy which must be compensated by corresponding pauses. In walking or climbing, also, we can accomplish most by proceeding at a steady pace. This is well known to the Swiss guides, who express the fact in their saying 'Ohne Hast, ohne Rast' (Without haste and without rest).

One other point which has been studied is the time which a muscle requires for complete recovery after exertion. It has been found that the fatigue involved in producing the latter part of a tracing requires much more time for recovery than that involved in writing the first half. Thus, suppose with a certain weight exhaustion is reached after thirty contractions, the time required for complete recovery can be ascertained by experiment. Then a fresh series of experiments can be carried out to ascertain the time needed for recovery after making fifteen contractions only. Now, what has been found is that in the latter case, when half only of the fatigue-curve is written, the time required for recovery is reduced, not to a half, but to a fourth. Moreover, the total amount of work done by the first fifteen contractions is much greater than that done by the second.

A great number of other interesting studies have been made by means of the ergograph, but we must now turn to the consideration of the practical bearing of the study of fatigue in children.

The first point of importance is the fact that all fatigue is, at bottom, of one kind. While there are some differences between muscular and nervous fatigue, still, as Professor Mosso expresses it, 'the exhaustion of energy is general; and all the magazines of energy can be drained by the exaggeration of any activity whatever of the organism. The conclusion to which we are led by my experiments is, that there exists only one kind of fatigue, namely, nervous fatigue; this is the preponderating phenomenon, and muscular fatigue, also, is at bottom an exhaustion of the nervous system.' This statement corresponds very well with what I said at the beginning of the chapter about the symptoms of fatigue as known in our own experience. It is obviously of considerable importance in relation to school-work, for it indicates that bodily exercise is not in any true sense a restorative after mental fatigue. It is true enough that a change of occupation does afford relief to the tired organs, but although local relief is thus given, the drain on the total store of nervous energy still continues.

But even if the relief which a change of occupation gives is local only, it is none the less important that it should be given. This seems clearly to be the teaching of the experiments upon the rate at which fatigued muscles recover. If an organ is exercised beyond a certain point, the amount of work it is capable of falls off very greatly, and recovery takes place very slowly. Hence the value in school-work of comparatively short periods of work (the time depending partly on the age of the child, partly on the nature of the lessons) separated by recreative intervals. Such intervals are likely to be of greater value if the children are allowed to do what they like—*i.e.*, to play—than if they are employed in physical drill, which involves assuming certain attitudes, paying attention, listening to the words of the instructor, recalling the meaning of such words, obeying commands, and otherwise exercising the very faculties which have been exercised in the lesson from the fatigue of which the children are supposed to be recovering.

On the other hand, even if muscular movement does involve a further drain of nervous energy, we must not forget that fatigue is not merely an exhaustion of energy, but is a form of poisoning, and movement, especially in the form of play in the open air, removes more waste products than it generates.

Another important consideration arising from the fatigue experiments is this: If all the occupations of a child's day involve a drain on the central sources of nervous energy, which is only recovered from during sleep, it is obvious that it must be of importance that the timetable should be so arranged that the morning hours can be devoted to the most fatiguing subjects. The ergograph has actually been made use of by Dr. Christopher of Chicago and others for the purpose of testing children in the hope of being able to draw up a scheme showing the relative amount of fatigue produced by different lessons. Various schemes of this kind have been drawn up, but the different observers are not agreed as to the order in which the various school subjects should be placed. This is just what one would expect, seeing that a great deal must depend upon the method of teaching and the personality of the teacher. Still, it seems to be pretty generally agreed that mathematics and foreign languages are amongst the most fatiguing subjects, singing and drawing amongst the least. Gymnastics also comes out as very fatiguing, but perhaps the ergographic test gives this subject less than justice.

Studies of atigue in school-children by other methods bear out the view that the children are freshest in the morning, and that the most fatiguing subjects should be taken then. This is only what one would expect from the common-sense standpoint. But observers seem to carry us a little further than unaided common sense would do when they insist that an afternoon session is of very little educational value. Thus Dr. Bellei of Bologne, who has been working at the subject of mental fatigue in school-children for some years, says emphatically that 'the work done by the children during the afternoon lessons is, on account of the great mental fatigue it involves, of no advantage to their instruction, but full of danger to their health.' This statement was made a few years ago, when the children studied had a midday interval lasting only from 12 to 12.45. Last year (1905) a similar series of experiments was carried out, the interval for rest being then from 12 till 2. The result in the two cases was so nearly identical as to show that the longer period of rest has really no advantage over the shorter.

Although a number of other observers have reached the same conclusions as Dr. Bellei, and agree with him in their opposition to an afternoon session, I do not think their work can be taken as altogether conclusive. After all, children must do something in the afternoon, and whatever they do will cause some fatigue. The experiments, however, seem conclusive in favour of reserving the forenoon for subjects which cause much mental fatigue, and utilizing the afternoon, if it may be utilized, for subjects of a more recreative nature, such as drawing, singing, and manual work.

The following is Dr. Kemsies' list of subjects arranged in order of the amount of fatigue entailed by each (highest first): Gymnastics (Physical Exercises), Mathematics, Foreign Languages, Religion, Native Tongue, Science and Geography, History, Singing, and Drawing.[1]

Tests of Fatigue.

The practical application of the various methods of studying fatigue to children has been found exceedingly difficult. Indeed, the pitfalls are so numerous that the investigations may most safely be left to specialists. Children are very likely to welcome any new test with great interest, and to carry it out with the enthusiasm of a new game, but the novelty soon wears off, and the test, if repeated frequently, may even come to be regarded as a tiresome task. Hence apparent fatigue may indicate nothing more than that the children are getting bored. Thus M. Schuyten tried a certain test for the first time in the afternoon, and repeated it upon the same children the following morning, and found that fatigue appeared to be greater in the morning. When the first trial was made in

[1] *Zeitschrift für Pädagogische Psychologie;* Berlin, January, 1899.

the morning, and the second in the afternoon, the reverse result was obtained. Practice, again, has an important influence, and has the appearance of counteracting the effects of fatigue. In other words, while fatigue decreases, practice increases the amount of work done.

The various tests made use of imply that fatigue diminishes muscular power; that it diminishes the quickness of reaction-time; that it dulls the acuteness of the senses; or that it affects the quickness or accuracy of mental operations.

Test 1: *The Ergograph.*—This has been sufficiently described.

Test 2: *The Dynamometer.*—This is a strong steel spring for testing the power of the grip. When squeezed in the hand the power exerted is indicated on a scale. The left hand has been tested with the dynamometer before and after writing a fatigue-curve with the right. In some cases no difference is found, in others there is a diminution of force, and in still others there is an increase. Individuals of the third variety have been held to be specially resistant to fatigue, but probably most of us know what it is to warm up to a task.

Test 3: *The Æsthesiometer.*—In severe fatigue the æsthesiometer may indicate a blunting of sensibility. In combined dynamometric and æsthesiometric tests the same three types are found as in Test 2. The individuals who show an increase in the force of grip show also an increased sensibility of touch.

Test 4: *Reaction-Time.*—Fatigue is indicated by an increase in the reaction-time.

Test 5: *Addition of Figures.*—A much-used test consists in the addition as rapidly as possible of long columns of single numerals. A mark is made at the point reached at the end of every minute. This test brings out the manner in which the gain in rapidity due to practice is counterbalanced by the greater, but later occurring, loss arising from fatigue.

Test 6 : *Dictation.*—A piece of dictation is given to a class at the beginning, and a piece of equal length and difficulty at the end of the period the fatigue of which is to be tested. The amount of fatigue is gauged by the greater proportion of errors of spelling and punctuation in the second test.

Instead of dictation the children may be asked to copy from their school reader as much as they can write in five minutes. In gauging the fatigue the amount written must be taken into account, as well as the number of mistakes.

Test 7 : *Memory Tests.*—Eight or more letters or figures are repeated by the teacher at the rate of one every second. The children are then asked to write down in order as many as they remember (auditory memory). Eight or more letters or figures are written on the board and exposed to view for ten seconds. The children are then asked to write down in order as many as they remember (visual memory). The smaller proportion remembered on repeating the tests after a period of work is taken as the gauge of the fatigue incurred.

CHAPTER XII

THE INSTINCTS OF CHILDREN

'Instinct is a great matter.'
Falstaff in *Henry IV.*

THERE is a prevalent opinion that one great distinction between man and the lower animals is this: Man is guided in his actions by reason, while animals are guided by instinct. As the poet Cowper expresses it in words not too flattering to human intelligence:

'Reasoning at every step he treads,
Man yet mistakes his way;
While meaner things, whom instinct leads,
Are seldom known to stray.'

Whether this distinction between man and beast is valid or not in the case of the adult it is not our present purpose to discuss. But it will be admitted that many of the actions of children cannot be accounted for as the outcome of reason; and as children are certainly in some respects nearer to the animal than is the adult, the question naturally suggests itself whether any of the traits we find in them are to be regarded as instinctive in character. Before we attempt to answer this question we must obviously decide what we mean by an instinct.

WHAT IS AN INSTINCT?

Of course, we all know in a general way what an instinct is; but as soon as we begin to seek a definition for it, we find that few terms have been used with greater looseness, and that it is almost impossible to frame any definition which will satisfy every one, or which will include all the conditions which may quite legitimately be called instinctive. One thing, however, is quite certain: we cannot be content simply to class all animal activities as due to instinct, and attribute all human activities to something else. To do so would be not merely to deny the great principle of continuity in organic development, but to credit animals with the possession of a mysterious power of whose nature we could know nothing, having nothing resembling it ourselves. Such ultimate explanations may sometimes be useful as affording a temporary resting-place for our unsatisfied curiosity, but from the scientific point of view they are worthless—nay, worse than worthless, because they hinder research. What we merely do not know we can try to find out. But we do not try to find out what we are convinced we can never know.

Perhaps, as a starting-point for discussion, we may define instinct as the performance of complex acts in such a way as to attain certain ends, without previous experience or instruction, and without foresight of the ends. This is practically the definition of Dr. A. R. Wallace. Herbert Spencer defines instinct as compound reflex action. Romanes adds that instinct involves a *mental* operation, and that the presence of *mind* is the only point that distinguishes instinctive from reflex action. Morgan objects to Romanes' definition on the ground that it is impossible to apply the criterion of consciousness. He defines instinct, as 'those co-ordinated activities which are performed by the individual in common with all the members of the same restricted group, in adaptation to certain circumstances, often recurring or essential to the life of the species.' The first of these definitions will serve our purpose very well in the meantime. We shall have a few points to add by and by.

Explanation of Instincts.

Now that we know what we are talking about, let us see whether we can get any further. Is it possible to understand instinct? Is there any 'explanation' of it which can make it more intelligible to our minds?

When one considers the most striking examples of instincts, such as are found among some of the insect tribes, one cannot wonder that instinct was long thought of as one of the insoluble and ultimate mysteries of life, a Divine gift of the Creator to His creatures, into whose nature it was useless for man to pry.

Allied to this position is the view which regards instinct as a manifestation of the direct presence in the animals of the Divine Wisdom guiding their activities. This view, which we owe, I think, to Schelling, is thus beautifully expressed by Dr. Martineau:

'While the insect and the bird continually *provide* for the morrow, they take *no thought* for the morrow: wholly surrendered to the infallible direction implanted in their nature, they are landed in good after good, and accomplish end after end, of which assuredly they had no preconception. Hence it is that their happy maintenance is held to be *Divine;* for though the agility which achieves it is theirs, the skill and forethought, absent from them, remain with God. Mind and volition there must be to produce works of order and beauty and enjoyment surpassing our highest strength and art; and failing as they manifestly do in the creatures below us, we refer them to the Creator above us.'

Whatever beauty or truth such explanations may possess, they cannot, I fear, be regarded as wholly satisfactory from the purely scientific point of view. From this attitude of *non possumus*, the Cartesian philosophy was undoubtedly a step in advance; and although no one nowadays regards animals as simply conscious automata, the view that they were had the great merit of recognizing that they were possessed of a nervous system, and that in some way their activities were dependent thereon. This opened the way for observation and experiment, and as man's activities became more and more obviously associated with his nervous organization, it became possible to compare the different actions of animals with our own.

When we try to classify the different forms of action which are met with in animals, we find that they can be arranged in some such series as this:

1. *Reflex.*—Such as sneezing.

2. *Instinctive.*—These can be most certainly recognized in very young animals, since experience is in them at a minimum.

3. *Habitual.*—These are closely allied to 2, but are first learned and afterwards performed without mental effort.

4. *Ideational.*—These imply a comparatively high degree of mental activity. Deliberately imitative and intelligent actions come under this head.

This classification is not very exact, but it will serve to give us some idea of the position occupied by instinctive actions relatively to other forms of activity.

Having now settled the relative position of instinctive activities between reflex and habitual actions, let us try to get a little closer to our problem of what an instinct is. Why do animals do the things they do? Why does a startled beetle 'feign death'? Why does a chicken show signs of fear on hearing the cry of a hawk? Why does a butterfly lay her eggs on the only kind of leaf which will serve the grubs, when hatched, for food? Such instincts, wonderful in their adaptation to the needs of the species, cannot, in the absence of experience or instruction, be the result of reason or forethought. Some other explanation must be sought when we find all the members of a species, when placed in identical circumstances, acting in identical ways. Is there nothing in human life which can help us to understand? Let us ask, Why does an infant, which has been accustomed to lie contentedly in its perambulator, suddenly catch hold of the edge and pull itself into the sitting posture, and refuse ever afterwards to lie down except when tired or sleepy? Does it reason within itself, saying, 'There are all sorts of interesting things over there which I cannot see. How can I manage? If I can get hold of that edge and pull hard, I shall raise myself up, and as I am now sufficiently tall to look over the edge, here goes!' Or does it simply catch the edge on the impulse of the moment and pull, to find itself, to its surprise, looking out upon the world? Why does the boy run about, and climb, and play, when he might sit still? Is it to strengthen his muscles, or to improve his appetite, or simply because he feels like it?

Because he feels like it! That is the answer the boy would give us; and that, I expect, is the answer which brings us nearest to an understanding of what an instinct is in the consciousness of its possessor. The child and the animal do what they do because they feel like it, and for no other reason whatever. There is something within them which says 'Do,' and do they must. If the result of the doing is a better view of the world, or a better appetite, or food, or provision for future generations, or escape from death, why, so much the better. Why does a child run after a ball? Why does a little girl love her doll? Why does a hen sit upon her eggs? In each case because they feel like it. 'To the broody hen,' says Professor James, 'the notion would probably seem monstrous that there should be a creature in the world to whom a nestful of eggs was not the utterly fascinating and precious, and never-to-be-too-much-sat-upon object which it is to her.'

Every Instinct is an Impulse.

So it all comes to this, that *every instinct is an impulse.* To say this may not explain instinct, but, at any rate, it brings it nearer to us by translating it in terms of something within our own experience. The animals do what they do because they feel like it. The child does the kind of things he does because he feels like it. The child, in his play, develops his muscles, learns to co-ordinate his movements, educates his senses, cultivates his powers of perception, forms his mind, and so, in yielding to the impulses implanted in his nature, 'is landed in good after good, accomplishes end after end, of which assuredly he had no preconception.'

Impulses and instincts, therefore, we may regard as, at any rate, very closely related on the subjective side. On the objective side, also, we find that they agree in that they are called forth by some stimulus. Until the stimulus is present the impulse is not felt. So soon as the stimulus appears the animal feels impelled to react at once.

Instincts not always Fixed and Invariable.

The impulses of children are very general in their nature—not the fixed and definite things which we are apt to picture instinct as being. The apparent fixity of instincts, however, is frequently due to our imperfect acquaintance with the habits of animals. When animals are carefully studied, it often appears that what look like instincts are really examples of very rapid learning. Dr. A. R. Wallace, for instance, pointed out long ago that, in the habits of birds, much of what is usually ascribed to instinct is due to imitation. Nestlings, removed from their parents when only a few days old, do not subsequently build the characteristic nest, or sing the characteristic song, of their kind. Nestling linnets, placed under the skylark, the woodlark, and the titlark, all, instead of the linnet's song, adhered to the song of the instructor (Daines Barrington).

On the other hand, Wallace showed that imitation plays a very large part in human activities. As a rule, he says, man neither alters nor improves when living in simple conditions like birds. The Arab tents and the Egyptian mud villages have undergone no improvement in thousands of years.

Some of the most wonderful examples of instinct are found among the insects, but if their habits were carefully watched we should doubtless be able to discover a greater amount of individual variation than we might expect. In the most interesting report on *Solitary Wasps*,[1] by George and Elizabeth Peckham, recently published by the State of Wisconsin, a number of examples of such individuality observed by the authors are recorded; and as these have not yet found a place among the stock which we find quoted and requoted in most works on instinct, perhaps I may be allowed to give a few brief extracts.

First of all let us see what these writers have to say about the stinging habits of the solitary wasps—habits which, as currently reported, are amongst the most extraordinary instances of instinct known. Of these habits Mr. Romanes, in his *Mental Evolution in Animals*, says:

[1] Lately reissued in a revised form as *Wasps: Social and Solitary*; Constable.

'Several species of the Hymenoptera display what I think may be justly deemed the most remarkable instincts in the world. These consist in stinging spiders, insects, and caterpillars in their chief nerve centres, in consequence of which the victims are not killed outright, but rendered motionless; they are then conveyed to a burrow previously formed by the sphex, and, continuing to live in their paralysed condition for several weeks, are at last available as food for the larvæ when they are hatched. Of course, the extraordinary fact which stands to be explained is that of the precise anatomical, not to say physiological, knowledge which appears to be displayed by the insect in stinging only the nerve centres of its prey.'

About this extraordinary story the Wisconsin naturalists write as follows: 'Before beginning any discussion of this remarkable instinct it is most important that we should have before us the facts that are to be explained. Romanes depended upon Fabre for his knowledge of the subject, and while Fabre is unquestionably the most accurate of observers, it does not necessarily follow that all of his inferences must be accepted. We have used the quotation from Romanes because it represents the current opinion of naturalists on the subject, and also because it presents the instinct as dependent upon several matters of fact. The first assertion—that the prey is stung in the chief nerve centres—is not a matter of ascertained fact at all, but an inference drawn from the observation that some of the victims are not killed, but only paralysed. The next step in the argument is a more or less unconscious one—namely, that the wasp does not desire to kill, but means to paralyse. Then comes the assertion that the prey remains motionless for several weeks. So far as we know the facts relating to this point, they are as follows: Out of our forty-five species of solitary wasps, about one-third kill their prey outright. Of those that remain there is not a single one in which the sting is given with invariable accuracy. To judge from results they scarcely sting twice alike, since the victims of the same wasp may be killed at once, or may live from one day to six weeks, or perhaps ultimately recover. Even the caterpillars of Ammophila, the most distinguished surgeon among the Aculeate Hymenoptera, live anywhere from two to forty days.'

The writers were able on several occasions to see the wasp capture a caterpillar and sting it. They found that the stings were not invariably inflicted in precisely the same way as supposed by Fabre, but that with the same species of wasp variations occurred both in the number of the wounds inflicted and the order they were given to the different segments. Moreover, in order to quiet a large caterpillar effectively it was not necessary that the stings should be inflicted exactly in the nerve ganglia, as the poison, rapidly diffusing from a sting in their neighbourhood, would quickly cause paralysis.

As to the idea that the caterpillars are purposely paralysed and not killed, in order that the grub might have a perfectly fresh supply of food, they found that the grubs devoured quite readily and subsisted quite well upon prey which had been killed outright. 'Should the wasps themselves be permitted to ask a question, they would probably inquire why we should imagine that they need to preserve the prey for "several weeks," when their larvæ hatch and begin to devour it in from one to three days.'

Other examples are given showing that in nest-building there are considerable individual variations. One species makes its nest in firm soil. After the nest has been excavated, the egg laid, and the food supplied, the mouth of the nest is closed up. One individual wedged two or three pellets into the top of the hole, kicked in a little dust, and then smoothed the surface over, finishing all within five minutes. Another worked for an hour, first filling the neck of the burrow with fine earth, which was jammed down with much energy, this part of the work being accompanied by a loud and cheerful humming, and next arranging the surface of the ground with scrupulous care, and sweeping every particle of dust to a distance. Still another, after filling up the burrow level with the ground, brought a quantity of fine grains of dirt to the spot, and then, picking up a small pebble in her mandibles, used it as a hammer to pound them down with rapid strokes!

These observations are sufficient to show that even in animals as low in the scale as insects instincts are not necessarily quite fixed and definite, but may be impulses of a more or less general kind. Instinct evidently prompts the wasp to fill up the mouth of its nest after laying eggs and providing provender, but leaves the details to the individual, so that a careless creature will finish the job in a few minutes, while a more careful worker may spend an hour or more upon it. If, therefore, the instincts of animals may take the form of a general impulse to act in a certain way, the argument that the innate impulses of children cannot be regarded as instinctive because of their lack of definiteness obviously falls to the ground.

Such individual variations in the conduct of instinctive activities as I have quoted will probably be found more and more common the more we study the *vie intime* of the lower animals. When we seek a cause for such variations, it is an obvious suggestion that the individual experience of an animal, by creating preferences and aversions, may be a modifying element. However blind an instinct may be, it is carried out to gratify an impulse, and its immediate effects—the effects, that is, which fall under the cognizance of the animal—form the basis of experience. When instincts appear in the form of a more or less general impulse towards certain kinds of action, the pleasant or unpleasant results of such action will modify the animal's future behaviour in presence of the stimulus which called them forth. To use Huber's expression, a little dose of judgment may come into play as a modifying element. The wariness of trout in a much-fished river is a case in point.

Experience, then, may be said to result in the learning of the movements necessary to satisfy innate impulses when they arise, and, secondly, in learning to restrain impulsive movements when unpleasant consequences have indicated the necessity for caution. With the acquisition of experience, and the ability to profit by it, the impulses cease to be blind. An individual who has thus, as it were, been let into his own secrets has taken an upward step in mental development, and can never afterwards be the automatic machine he seemed before.

The Succession of Instincts.

The instincts proper to an animal are not all present at the time of birth, but appear one by one or in successive groups, as the animal becomes more perfectly developed. As Morgan expresses it, they are frequently 'periodic in development and serial in character;' that is to say, they do not only succeed one another in point of time, but the earlier ones may prepare the way for the later, or may, by the experience of which they form the basis, modify their form when they appear. The ability to restrain an impulse in presence of the stimulus, which would naturally call it into action, is one very important example of such modification. Such restraint may be associated with the presence of contrary impulses, and when these impulses nearly balance one another there may be a considerable consumption of time before either of them becomes sufficiently dominant to pass into action. The appearance of hesitation or indecision produced by such a conflict of impulses conceals the impulsive character of the resulting activity. Yet this apparent absence of impulse may not indicate any real deficiency, but the presence of contrary impulses, or that the impulses are so numerous that they clash with each other.

The influence of inhibition is well seen in the contrast between the trained adult and the untrained child. The impulsive character of the child's activities is not due to the excessive number of his impulses, but to the want of the controlling influence of impulses which arise from a deliberate and rational regard for consequences.

Another way in which instincts are liable to undergo modification is by the influence of habit. The instincts which appear successively in the course of development may be performed as fatally, and with as little prevision of their results, as are the first instinctive actions after birth; but very frequently, instead of being perfect at the time of their appearance, some little practice is required. Eventually, however, they are carried out as smoothly and with as little conscious attention as the most perfect instincts. In such cases we have a transition between the perfect instincts on the one hand, and habitual activities on the other. The point of present interest is that habits formed on the basis of instinct may owe their exact form to the circumstances under which they arose. A good example of the influence of habit in instinct is seen in the 'happy families,' so-called, occasionally exhibited at shows, and commonly regarded as wonderful examples of the influence of training. As a matter of fact, the trainer has very little to boast of, as he has merely succeeded in taking advantage of the influence of habit in restraining later developed instincts. Practically all animals are tame and fearless at the time of birth, and if natural enemies are only brought up together from birth, their habitual association may inhibit the development of the natural antipathy, and they may live quite happily together.

Instinct and Intelligence.

Many purely instinctive actions have a curious semblance of intelligence, and some years ago the late Mr. Romanes brought forward an ingenious theory to account for such cases. The burying of food by young animals—*e.g.*, dogs—is certainly a purely instinctive act, yet it appears to display intelligent forethought. Mr. Romanes accordingly suggested that instincts of this kind might have originated as intelligent acts, have been repeated a number of times until they became habitual, and finally have been handed down by heredity to the offspring. Such instincts he spoke of as due to 'lapsed intelligence.' To those who accept Weismann's doctrine that acquired characters are not inherited this theory is, of course, unacceptable, and, as most biologists are now of Weismann's opinion, the theory of lapsed intelligence may be regarded as having fallen to the ground.

The real relationship between instinct and intelligence seems rather to be that at which I have already hinted—namely, that when an animal has attained sufficient mental power to become cognizant of its own actions and the results which followed them, and when its memory has become sufficiently good to profit by the lessons of experience, intelligence may then begin to play a part in the guidance of instinctive actions. Among the more intelligent animals it is easy to find examples of acts which are performed in the first instance purely instinctively, and performed in the same way by all members of the species, but which are quickly altered, modified, or even set aside as a result of individual experience.

Instincts thus afford an opportunity for the development of intelligence, and by following out its instincts in a variety of circumstances the animal gains experience and knowledge of the world, and so its intelligence is ripened. The more intelligent the animal the less fixed and definite do its instincts appear, until in the more highly endowed animals the original instincts, or many of them, have become so fluid that they appear simply as more or less general impulses to act in certain more or less definite ways, and are ultimately scarcely recognizable as instincts at all.

Special Human Instincts.

This last stage is best represented in the human subject, and we may now turn our attention to the inborn impulsive actions and emotions of children which modern psychology tends more and more to regard as truly instinctive in character, the genuine representatives, possibly in an imperfect form, of ancestral instincts.

Professor Preyer, in his book on *The Mind of the Child*, tells us that the instinctive movements of human beings are not numerous, and are difficult to recognize (with the exception of the sexual ones) when once the earliest youth is past. Professor James,[1] on the other hand, tells us that 'no other mammal, not even the monkey, shows so large a list.'

James's list includes the instincts mentioned by Preyer. Here it is:

[1] *Text-book of Psychology*, vol. ii., p. 403.

'Among the first reflex movements are crying on contact with air, sneezing, snuffling, snoring, coughing, sighing, sobbing, gagging, vomiting, hiccuping, starting, moving the limbs when touched, and sucking. To these may now be added hanging by the hands. Later on come biting, clasping objects and carrying them to the mouth, sitting up, standing, creeping, and walking. It is probable that the centres for executing these three latter acts ripen spontaneously, just as those for flight have been proved to do in birds, and that the appearance of *learning* to stand and walk, by trial and failure, is due to the exercise beginning in most children before the centres are ripe. Children vary enormously in the rate and manner in which they learn to walk. With the first impulses to imitation, those to significant vocalization are born. Emulation rapidly ensues, with pugnacity in its train. Fear of definite objects comes in early, sympathy much later, though on the instinct (or emotion?) of sympathy so much in human life depends. Shyness and sociability, play, curiosity, secretiveness, acquisitiveness, all begin very early in life. The hunting instinct, modesty, love, the parental instinct, etc., come later. By the age of fifteen or sixteen the whole array of human instincts is complete.'

The earliest of these movements, those which are present at the time of birth, or which are noticed very soon afterwards, are little more than reflex movements. The centres for executing the movements are ripe for a considerable time before birth.

The most characteristic of these early instinctive movements is that which gave the 'suckling' its name. This is a complex co-ordinated movement, associated with swallowing, and excited by any object which can be sucked getting into the mouth. One of the principal reasons for regarding sucking as more than a reflex movement is that it is carried out with full vigour only if the child is hungry or incompletely satisfied. At a later period, when sucking has become a habit, a child may suck for the pleasure of it, even when the stomach is full. Sucking is also, like some other instincts, remarkably transitory. If an infant is fed with a spoon for a few days, it is often difficult to get it to take the breast subsequently. Normally the *instinct* of sucking seems to start the *habit* of sucking, and then lapses as an instinct, the child continuing to suck as a habit.

Young infants are often said, rather absurdly, to seek the breast. At first, however, infants do not find the nipple without help, and if held to the breast will often suck hard at the skin without apparently noticing the error. At an early period they will make lateral movements of the head as if groping for the nipple, and these movements may also be instinctive. Preyer speaks of infants in the first week opening their eyes when placed near the breast, and keeping them open during sucking. I have seen children doing this, but I do not think it is common. Most young infants keep their eyes closed while at the breast. Children are probably to some extent guided to the breast by sight and smell at a comparatively early period, while the nipple is probably discovered by the sense of touch.

Galton has a curious note on sucking in his book on *Human Faculty*. 'It is marvellous,' he says, 'how soon goats find out children and tempt them to suckle. I have had the milk of my goats, when encamping for the night in African travels, drained dry by small black children, who had not the strength to do more than crawl about, but nevertheless came to some secret understanding with the goats, and fed themselves.'

The instinct of grasping, which is very important from the part it plays in the child's mental development, has already been described.

The impulse to move about from one place to another undoubtedly appears quite spontaneously, and often suddenly. One day the child is quite content to remain wherever it is placed; the next, nothing short of physical restraint will keep it long in one spot. The time at which this impulse appears varies considerably in different children, depending partly on the general nutrition of the child, the firmness of the bones, the strength of the muscles, and also on the general liveliness and desire for movement. When this impulse does appear, the child ought to be allowed to move about freely and investigate its surroundings, as this greatly aids its mental development. Some children move about by creeping, but many children never creep at all. Some of these roll from place to place; some get into a sitting posture and hitch themselves along on their hands; others use one leg for the same purpose, keeping the other curled up under them.

The period of walking, also, varies greatly. James thinks that children would probably be able to walk without any preliminary learning if they could be kept off their feet for a week or so after the first impulse to attempt walking has appeared. He rather cruelly suggests that a small blister on the sole of each foot at the critical moment would do the business.

The instinct of *imitation* is without doubt one of the most important, and plays an important part in mental development. Man is pre-eminently *the* imitative animal. Imitative movements almost always begin during the second half of the first year. Those which have been noticed earlier, such as the crying of a young baby when it hears another cry, are of somewhat doubtful nature. During the second year imitative movements become very numerous, and include all the usual baby accomplishments—blowing out the candle, blowing a watch to make it open, waving 'Ta-ta,' etc. By and by we find the child watching with attention all the actions he observes about him, and striving to repeat them. A little girl will repeat upon her doll all her own experiences at the hands of her nurse, feeding it, bathing it, putting it to bed. The expressions and gestures of those about the child all furnish copy for imitation, and the child readily lays the foundations of future habits by copying the examples set before him.

The imitative instinct is not confined to the child. It runs through the whole of human life, and influences all our actions and thoughts. There is nothing more perennial in our nature than this. In turn we roll hoops, and fly kites, and collect stamps, and play cricket, and admire Tennyson, because our fellows do the same. In our fishing and shooting, our choice of a profession, our political, and philosophical, and religious opinions, imitation, if no longer all-important, yet plays a larger part than we commonly care to own. Even in our sins there is little originality. Like Rudyard Kipling's Tomlinson, we sin a sin which another man sinned, we do a good deed which another man did, and have nothing of our own to show, whether for our salvation or otherwise, when we come to die. Is this not so? Some people, I expect, will say that not only is it so, but that it ought to be so. The greater part of what we know must be learned by imitation; the greater number of the things which we do must be learned in the same way. If the child is heir of all the ages, it is only by imitation that he can enter on his inheritance. In our school-work imitation is of supreme importance. It is the source of all practice and learning, the mainstay of all discipline, the keeper of all order. All this must be allowed. Yet I think all teachers should constantly ask themselves whether they do not expect the children to be too *exclusively* imitative. They should ask whether the children have anywhere *any* chance for *any* originality, for any inventiveness, for doing anything of their own. There are few school subjects which could not be taught in such a way as to give the children something to do for themselves. *Young* children are necessarily almost entirely imitative, owing to their want of experience, yet Froebel did not hesitate to find a place for inventiveness in the kindergarten—a hint of what should be done to a much larger extent with older children.

Instinctive Emotions.

The emotions of children may be as clearly instinctive in character as their activities. *Fear* is one of the best examples of instinctive emotions, and is the one which has been most studied. It appears very early—often during the first few weeks of life, and quite antecedent to any experience of danger or of pain. It is an emotional reaction closely related to astonishment and curiosity on the one hand, and ferocity on the other. The things which frighten us are the things we also desire to attack, to overcome, to destroy. The overcoming of the earlier fears marks the progress of intellectual development, and with this other fears develop into which there enters more or less distinctly an intellectual or imaginative element.

One of the best descriptive accounts of fear is given by Darwin in his work on the *Expression of the Emotions*. Mosso's work on *Fear*, of which there is an English translation, is mainly descriptive of the expression of fear and of its physiological accompaniments. The most elaborate discussion of the causes of fear is to be found in Stanley Hall's paper on the subject,[1] which is based upon the

[1] *Amer. Journ. of Psychology*, vol. viii., 1897.

returns to a syllabus. A number of minor studies on the same lines have been published by various authors.

Very young children may exhibit a sort of innate or organic fear, starting, trembling, and bursting into loud screams at any unusual sensation, especially if startled by a loud noise. After a time an intellectual interest in sounds develops, and on hearing any strange sound the child asks, 'What makes that? Will it come again?' The effect of loud or unexpected noises in producing or heightening fear continues to be felt more or less throughout life. Thunder is much more feared than lightning. Children are often delighted by the flashes of lightning, but greatly terrified by the noise of the thunder. Stanley Hall speaks of the profound sense of the reality of things above which is produced by the noise of thunder, alike in children and in all primitive people. Thunder has also a powerful effect in stimulating the imagination, and during a thunderstorm children picture to themselves a battle going on above, bombs bursting, or God driving along in a chariot. Some think of the sky cracking or the moon bursting, or conceive of the firmament as a dome of metal over which balls are being rolled or vehicles driven. All sorts of noisy occupations, the beating of drums, the working of machinery, the moving of furniture, are thought of as producing the noise, and fears are felt of things falling down through the sky, or of the sky itself approaching to crush the earth.

Fear of darkness is very common and often very intense. There are probably few children who do not suffer from it at some time and in some degree. It is, of course, frequently suggested by stories of ghosts, robbers, or other terrors, but even in children who have been most carefully guarded from such suggestions this fear may break out suddenly and refuse to be reasoned away. Even adults may feel uneasy in the dark, and this not only in strange places, such as woods, but in their own house. The feeling of fear may be quite strong even when one knows there is no danger, and may become quite overwhelming if noises are heard whose cause is uncertain. Shadows and irregular forms dimly seen in semidarkness readily call up images of lurking robbers, evil spirits, or savage beasts. If any of these move, or are thought to move, the terror becomes much more intense, and brings with it a feeling of utter helplessness and inability either to fight if attacked or to run away. Fear of this kind evidently suggests the evolutionary explanation. It seems to serve no present purpose. Practically one is quite as safe, often really safer, during the hours of darkness than in daylight. But until quite recently in human history this was not so. During ages of immense duration the time of darkness was, for our ancestors, a time of special danger. Wild animals were apt to lodge in dark caverns or to lurk in dense woods, and to attack suddenly the unwary traveller. During the night hours carnivorous animals were abroad, and human enemies were wont to make their attacks. As Stanley Hall says, '*Now*, darkness and the unknown have few terrors; *once*, they had little else.'

A young turkey will run helter-skelter, and crouch, quivering with fear, in the nearest cover, on hearing for the first time the cry of a hawk it has never seen. If this be an instinctive fear associated with the danger and death which the turkey's ancestors have suffered from hawks, why may the deep-seated human fear of darkness and dark places not have an instinctive basis, having roots in a far-off past?

Fear of fur is another strange fear not uncommon in babies. Stanley Hall's first returns included 111 cases; in a later paper he speaks of 223. It commonly appears during the first year of life, and appears to be associated specially with the sense of touch. The child is not afraid on seeing a furry object, but on touching it he at once becomes very frightened and screams, or may even have fits. An imbecile child under my care was greatly frightened by anything of a furry nature, and screamed on touching a velvet-covered picture-frame. Another child was so frightened at the touch of fur that a beautiful fur-trimmed cloak her mother bought for her had to be put aside. Every time it was put on the child screamed until it was taken off. This fear is usually quite transient, and the child soon learns to love playing with the cat or stroking fur. But what is the teleology of the fear? Why should a baby go into convulsions or even be frightened on touching fur? The cause must be something in the baby, since fur has never been experienced as hurtful.

Big eyes and teeth may also cause fear. Fear of the supernatural is an important form. Fear is at the root of all superstitions. Anything which is very much out of the course of our normal experience, or which baffles our expectation, is liable to cause fear. We experience a curious shrinking if we stretch out our hand to pick up a piece of wood, and find ourselves grasping something cold and clammy. In many fears of this class a number of the simpler causes are found in combination. Ghosts are seen most frequently among the shifting shadows of a moonlit churchyard. In its most refined form fear may appear in the sense of awe or sublimity.

In Hall's table of commonly recorded fears, it appears that 'thunderstorms are feared most; that reptiles, with strangers and darkness, are close seconds; while fire, death, domestic animals, disease, wild animals, water, ghosts, insects, rats and mice, robbers, high winds, dream fears, cats, dogs, cyclones, solitude, drowning, etc., represent decreasing degrees of fearfulness.'

These studies show that fear is to be regarded as a normal human experience; that many forms of fear are innate or instinctive in origin, preceding, as they do, all experience of danger; that the character of the principal objects feared (darkness, loud noises, strangers, animals, etc.) has no obvious teleology in the present circumstances of human life, while the teleology would be obvious in a being living as primitive man actually did live during hundreds of thousands of years. Many apparently inexplicable fears may arise from forgotten frights in childhood, but the application of such an explanation is too limited. So far as our present evidence goes, there seems to be a good deal to be said in favour of Hall's contention that in these innate fears we have some of the oldest things in the human soul.

Anger, *resentment*, and *pugnacity* are closely allied to fear, and their early appearance and uncontrollable character in children surely indicate their primitive nature. They may be regarded as representing the instinct of self-preservation in its active form. Considering the important part which fighting has played in human evolution, it must have been of advantage that pugnacity should early have become instinctive and hereditary.

A young friend of mine was questioning his mother as to what he should find to do in the country, where the family were going for a holiday. 'Well,' said his mother, 'I expect you will find some other little boys to make friends with and to play with.' 'Oh, I do hope I shall find some enemies, too,' exclaimed the boy; 'it is so dull when one only has friends.' There, surely, spake the natural voice of instinct!

Sympathy does not appear so early as some of the other instinctive tendencies, yet it also must surely be regarded as primitive. The sympathy between mother and child certainly precedes any intelligent appreciation by the child of the relationship, and this organic sympathy inappreciably develops, *pari passu* with the progress of the intellect, into the higher emotion of sympathetic love. For a long time, however, the child's very demonstrative affection is only irreflective in character, and consequently we frequently find children innocently wounding by their remarks the feelings of those they love.

Play.

The many forms of play in which children delight are best understood when they are regarded as efforts to satisfy various primitive instincts. This theory, which has been elaborated by Groos in his works upon the *Play of Animals* and upon the *Play of Man*, offers a much more satisfactory explanation of the facts than the classical theory of Schiller, that play is simply an outlet for the excessive energy of youth. The latter theory takes no account of the particular forms of play. It offers no reason, for example, why puppies should play at fighting, kittens at chasing some moving object or at stalking and springing upon it, kids at scampering pell-mell up the steepest rocks and hillocks in their neighbourhood. According to Groos's theory, the special forms of play are at once intelligible. The young animal instinctively plays at the kind of thing he will have to do in real earnest later on. Play is his apprenticeship for the serious business of life. The animal which plays in youth, instead of inheriting fixed and stereotyped instincts, acquires some individual experience of the world and some knowledge of its own powers which form its stock-in-trade for the game of life. Such experience permits the development of individual intelligence with comparatively little risk from failures, which might be fatal when play gives place to earnest.

In the play of children we may trace all the primitive forms of instinct appearing successively, and leading by their exercise to the acquirements of the human powers. Just as puppies play at the kind of things which dogs do, so children delight to play at the kind of things which men do, or did in countless generations in the past.

It has been objected to Groos's theory that children, as a matter of fact, do *not* play at what they will do in earnest later on. On the contrary, their plays are reminiscent of the past. Children perpetuate in their plays the serious occupations of their forefathers. The attempt has been made to find in the successive play interests of children indications of the hunting, the pastoral, the agricultural, and other stages through which man has passed in his progress from savagery to civilization. Play, according to this view, is recapitulatory; according to Groos, it is preparatory.

I do not regard these views as mutually exclusive. In play the child certainly finds an outlet for the exercise of instincts inherited from his forefathers, and follows interests which were at one time of paramount importance, but in so doing he develops powers which he will exercise throughout life, albeit in directions very different from his childish ideals. The various ball games of boyhood, for example, may point back to the time when it was essential that every youth should run fast and throw straight; and if the victory is no longer to the swift, nor the battle to the strong, the dexterity, the resourcefulness, the courage, and self-confidence which are developed through play are still important factors in life.

Play, then, may be regarded as Nature's method of education. The student will find it of great interest to work out for himself two questions which may be asked with regard to any of the favourite childish plays and games. The first query is, What particular instincts or impulses are finding satisfaction in this play? The second is, In what directions is this play of educative value?

One may divide the play period roughly into three terms, each characterized by the prevalence of certain kinds of play. These terms are not sharply divided from one another, but there is little difficulty in recognizing that the multifarious varieties of play in which children indulge may be grouped in a pretty definite programme, and this programme in its general form is followed by all children alike. The child's inborn impulses prompt him to certain general forms of action in his play, but the particular games at which he plays are learned by imitation from other children.

The first play period includes the first six or seven years. The play of the child during this period may be characterized as individualistic. It is a period of plays rather than a period of games. The earliest impulse manifested in play in infancy is the impulse of movement. Movements of various kinds constitute the play in the infant's kicking, gesticulating, grimacing, cooing, crowing, laughing, babbling; and in the talking, chattering, singing, running, jumping, climbing of little children, movement for its own sake is the main element. The healthy child at this period has an irresistible craving *not* to 'sit still' and 'be good.'

When the child has gained some control over his bodily powers, his impulses prompt him to more complex forms of action, and we find among the plays which attract him skipping, hoops, tops, kites, ride-a-cock-horse, dancing in its simpler forms.

Then the impulse to construct (sand-castles, mud-pies, bricks, scribbling, drawing, modelling) and the impulse to investigate (dropping things, hammering, rattling, teasing, destroying) begin during this period, and, if rightly guided, are amongst the most valuable, from the educational point of view, of the impulses of childhood. Far from being confined to this period, they may be, and ought to be, cultivated so as to lay the foundations for the hobbies and occupations of adult life.

The impulse to imitate also begins very early in life, almost invariably during the second six months. While it never completely disappears, it is strongest in young children, and is shown in such plays as imitating sounds (barking, mooing, etc.), gestures, actions, pretending to be a horse, a dog, an engine, dressing up, acting, make-believe plays—home, shop, school, railway-station, etc.

The second play period extends from the seventh to the twelfth year. We now find a further development of some of the impulses which appeared in the first term; but the chief feature is the appearance of the characteristic games of boyhood. Many of these games are of great antiquity. They are learned by imitation generation after generation, and owe their durability to the satisfaction they give to certain primitive instincts, especially the fighting and hunting instincts, which are so strong in boyhood. The spirit of emulation also is evidently innate in boyhood, and is fostered by many of the most attractive games which stimulate each boy to do his best, to develop to the highest possible point his strength, his swiftness, his accuracy of hand and eye, his skill in doing difficult things. This aspect of boys' games is worthy of consideration by teachers who desire to banish the spirit of emulation entirely from the classroom. The boy who does not care whether or not he can be beaten will make neither a good athlete nor a good scholar.

The third play term is the most important of all, because we find now appearing some of the most important of the human impulses. It extends from about the twelfth year, and is characterized by those games which appeal to the social instincts and develop the social spirit. The chief characteristic of the games of this period is that they are played in teams or groups, in which each individual player must play, not for himself, but for his team. Games of this description appeal especially to members of the Anglo-Saxon race. Many of the lower and less energetic races have no corresponding games at all. I need scarcely add that no animals indulge in games of this kind. The principal games in this group are football, cricket, hockey, baseball, and lacrosse.

If play is of such great importance as a preparation for later life, it should be apparent that the games which children play and the conditions and rules under which they play them are worthy of serious attention. Yet there are many people who seem to imagine that the doctrine that play is an education implies that, if the child is only playing, all is well. An acute critic has even charged the founder of the kindergarten with holding this view, and has taken Froebel's assertion that 'play holds the sources of all that is good' as implying that work is presumably a source of evil, or, at least, that no good can come of it, since all the good comes from play. But what if work also has its roots in play?—which is, of course, what Froebel really taught—one would have thought clearly enough. And if it is asserted that we may find in a child's play the germs of all good, it is nowhere implied that we may not find germs of evil also. On the contrary, Froebel asserts emphatically that, whether a child's future life is to be pure or sullied, peaceful or rent with passion, is, in fact, determined by the *nature* of his play and *conditions* under which he plays. One great aim of the kindergarten system is to show us how children may be saved from the silliness and inanity, the frequent coarseness and vulgarity, of their play when they are left entirely to themselves.

Let me now sum up the chief points in this chapter. We have seen that in non-intelligent animals the activities are governed by fixed and definite instincts. Passing up the scale, we find that the more intelligent animals become, the more do their instincts tend to become rounded off into generalized impulses. In the most intelligent animals a still further relaxation of the rôle of inspiration is provided for by the appearance of a play period, which permits of the acquisition of individual experience and the development of individual intelligence while the young are still under the care of their parents. For the proper development of intelligence, it is of great importance that the various play instincts should have full scope in suitable directions.

CHAPTER XIII

INSTINCT AND HABIT[1]

'The only kind of instinct that is really to be trusted is that educated instinct we call a virtue.'—MACCUNN.

IT is a commonplace of modern educational theory that the methods of education must be adapted to, and determined by, the nature of the being to be educated. The force of this dictum can only be fully understood when we recognize the strength and complexity of those innate tendencies to action which I described in the last chapter as the instincts of children.

The study of such instincts and their relationship to the habits which education aims at forming is leading us to a very different conception of education, and of the part to be played by the educator, than was possible when Dr. Samuel Johnson declared, in often quoted words, that there could never be anything new learned about education, because everything that was to be known had been known from time immemorial. By way, I suppose, of showing how much actually was known in his day, he declared that, since children obviously cannot be governed by reason, they must be governed by fear. In our own milder days such a statement stands self-condemned, and the educator endeavours to render the course of conduct

[1] One or two sentences in this chapter are taken from the author's *The Child: His Nature and Nurture*, chapter on Habit.

he desires attractive and pleasurable, rather than to illustrate frequently, and with emphasis, the fact that the way of transgressors is hard.

Now, I am going to make no attempt to controvert the obvious fact that pleasure and pain are very powerful instruments in the hands of the educator of youth. The thesis I do wish to maintain is that their place is second, and not first. The first place, in an education based on child-nature, is to be occupied by the innate and hereditary tendencies to action. To a very large extent the spontaneous activities of children are governed neither by desire for pleasure nor by fear of pain, but by impulses from within which prompt to action without foresight of results or calculation of consequences as measured in pleasure or pain. In such impulses, as they arise, we find the opportunity and the hope of the educator. All education depends upon the formation of habits, and never is a habit so firmly grounded, never is a virtue so deeply implanted in the character, as when it has its roots in some innate impulse. The satisfaction of each impulse, as it arises in childhood and youth, becomes the ruling passion for a season, and the mode in which satisfaction is obtained has an abiding influence on the conduct of life and on the formation of character. Let us, then, consider briefly some of the chief features of habit, and the connexion between acquired habit and the innate impulses of the child.

Definition.—Habit may be defined as the disposition to the performance of certain actions, which results from their previous repeated performance. An habitual act is one which tends to be performed whenever the circumstances are such as have repeatedly been attended by its performance by the individual.

This disposition to greater ease in performance applies not only to bodily actions, but to all the varieties of mental processes. Perception, memory, the association of ideas, the tendency to recurrence of modes of feeling or of trains of thought, all depend upon the law of habit.

PHYSIOLOGY OF HABIT.

Physiologically habit must be regarded as dependent upon pathways of discharge for nervous currents which have been laid down in the nervous system. In this respect habitual actions agree with reflex and instinctive actions which depend upon such pathways, in their case inherited from the parent. Habits are artificial reflexes which follow some beaten pathway of discharge or follow an associated system of such paths.

The plasticity of the nervous system, whereby all the nervous currents which traverse it tend to deepen and make more permanent the paths they traverse, is in reality only a particular instance of the property of all material structures to retain traces of the physical impressions made upon them. Fundamentally, habit is physical rather than physiological. We find in inorganic nature innumerable analogies to habit in the way things shape themselves to their uses. A shoe becomes more comfortable after it has been worn for some time, not so much because the leather has become softer and more pliable as because the shoe has acquired the habit of the foot. A lock will work more easily, and a machine will run more smoothly, after a certain amount of use. Even a piece of elastic is not precisely the same after it has been stretched. There is a sort of material memory in substances which retains impressions made upon them.

This tendency to retain impressions is even more marked in the case of living than in the case of inorganic matter.

In living, and especially in growing, tissues the material particles are continually passing away, and being replaced or added to by others, and the particular direction taken by the processes of growth will continue afterwards to influence the function of the tissue. One person habitually 'catches cold' in his head, and another in his chest, because previous attacks of catarrhal inflammation in the nasal and in the bronchial mucous membranes respectively have left these tracts particularly vulnerable.

In the case of the nervous system plasticity is a very marked feature. The nerve currents which enter the brain through the sensory nerves tend to follow outgoing channels which have been laid down, and whose arrangement is manifested by the nature of the resulting movements and activities. The more frequently such a sensation-action circuit is traversed, the deeper and more permanent the pathway becomes, and the more readily does the action tend to be repeated.

Some of these pathways are laid down in the nervous system antecedently to requirements by the forces of heredity. Examples of this are furnished by the organic reflexes. The nervous mechanisms for breathing, sneezing, crying, sucking, swallowing, and others, are all laid down before they are called into action.

When any of the primitive pathways begin to be traversed by nerve currents, these currents often seem to furnish the necessary stimulus for the laying down of other series of paths. A good example of this is found in the development of the visual centres, and of the power of visual perception. The visual centres, as we have seen, are in a very undeveloped condition at birth, but are stimulated to further development as soon as nerve currents begin to traverse the already existing reflex arc between the retina and the iris.

The whole complex process of perception depends upon the formation of habitual tracks of association between the various sensory centres of the brain, and these tracks are dependent for their development upon the combined use of the senses in investigating the outside world. The associations between certain appearances, and the touch, taste, and other sensations they suggest, are found at a very early age, and are simply habits which each of us has acquired in childhood.

In the development of the visual centres and the associated pathways of perception the reflex arc upon which depends the contraction of the pupil in response to light is a definite anatomical structure, which can be dissected out and demonstrated in the brain. In the case, however, of the more complex paths traversed by nerve currents such anatomical demonstration is at present impossible, and the very existence of the more complex paths is simply an inference from the nature of the motor response to various stimuli. This is the case with all the innate impulsive tendencies of children. Every one of them indicates the presence of some pathway, or associated system of pathways, of discharge which have been laid down in the nervous system, although it is not possible to demonstrate these by dissection. And just as the nerve currents which traverse the visual path furnish an essential stimulus for the development of the visual centres, and for the formation of those habitually co-ordinated associations which are necessary for perception, so in the case of every one of the child's instinctive tendencies as it appears we should recognize that nerve currents are beginning to traverse one of the hereditary pathways of the nervous system, and that these will result in a new set of habits being formed.

Although the formation of pathways through the nervous system is dependent on heredity, yet the details of their interrelations and associations are influenced by the exact character of the experiences and activities of the individual. The child inherits tendencies to do all the various kinds of things which human beings can do; but the precise things which he does, and the manner in which he does them—in other words, the precise habits which he forms—are dependent upon his particular opportunities, and the manner in which he takes advantage of them while his habits are forming.

All education depends upon the possibility of thus laying down or modifying the lines of habit; and the practical conclusion to which we are led by the consideration of the relationship between instinct and habit is, that it should be the part of education to furnish such outlets and encourage such exercise of the various instinctive tendencies as they arise as will lead to the formation of habits which are of advantage to the individual and his fellows, and prevent the formation of those which are hurtful. As James says of the instincts of children: 'In a perfectly rounded development every one of these instincts would start a habit towards certain objects, and inhibit a habit towards certain others.'

The Practical Value of Habit.

1. When actions become habitual they can be carried out with greater promptness and accuracy, and their execution is attended by less fatigue. In learning to walk, or dance, or ride a bicycle, or play the piano, or use our muscles in any new way, the attention is at first strained, and energy is exhausted in the effort. Every separate movement necessary to the new accomplishment requires to be remembered, supervised, and deliberately willed, and even then the required movements are executed in a

clumsy and awkward fashion. But every time the movements are carried out they become more easy of performance. As the common saying has it, 'Practice makes perfect.'

2. Habitual actions are carried out with a minimum of conscious attention. Not only can the simpler habitual actions be performed without exciting or requiring attention, but even very complex actions may be carried on quite perfectly with scarcely any conscious attention. In this way we are saved an immense amount of fatigue, while our thoughts may be directed into other channels. Occasionally this tendency of habitual actions to perform themselves unconsciously leads to amusing consequences, as when an elderly gentleman going to his bedroom to dress for dinner allows his mind to wander, with the result that instead of dressing he retires to bed.

3. Habit not only renders particular actions easier of performance, but particular kinds of actions. Thus, a sculptor can very easily chisel a design he has never copied before, because his hands and eyes are trained to the habitual performance of work of that kind. Mental processes are also aided by habit. So, if we wish assistance with some problem which is puzzling us, and know no one who has expressly studied it, we take it to the friend in whose line—be it mathematical, or literary, or biological—we consider it to be.

Habit therefore influences in an important manner the general direction of our activities. Hence the necessity of training children properly at an early age, in order that the first-formed habits may assist volition in right directions.

Intellectual and Ethical Aspects of Habit.

These, then, are the principal advantages of habit regarded from the mechanical point of view. But habit has a more important aspect than those already considered. If habit were merely a device for rendering our acquisitions stable, the whole history of our life would be the story of the growing dominion of mechanical activity, and at last, performing our daily round with faultless uniformity, we should end our lives where the ants and bees begin; that is to say, we should have no mental, still less any moral, existence. With no interest in the past and no care for the future, we should go day by day our accustomed round, 'enclosed within the moments as they came.' But thus to face the mill of habit is not life. To this—life's mechanism—must be added other things before man can become the intelligent and responsible being he is. And here lies *the* distinction between the unconscious perfection of instinct and the eventually equally unconscious performance of habit. All our regularities of habit do indeed tend to become purely automatic in their performance, and, regarded from without, might seem to have no greater value than inborn instinctive activities; but, regarded from within, habit acquires a new significance as the process upon which our mental and moral life is built.

Has it ever seemed very strange that the infant when he enters the world is such a helpless morsel as he is? Can there, it may be asked, be any advantage to *him* in the long period of tutelage he must undergo before he can guide his own limbs? Surely the direction of his own movements and the control of his own senses might have been inherited directly, so that he might at once have entered on his playtime. The chicken almost as soon as it leaves the egg is able to follow moving objects with its eyes, and to direct such a complicated action as pecking at a speck or at an insect with almost infallible precision, while the child, on the contrary, has to acquire by slow degrees even the simplest movements. In all this the chick would surely be the better off of the two if the child did not, in learning all such things, learn a great deal more. And this is what we learn from a study of the development of habit in the individual—that all our activities, which have been individually acquired, yet in the end are performed with the unconsciousness of instinct, have been necessary stages in our development. They tell, not only what we do, but what we are. There is not one of them which did not at one time form for us one of the most attractive centres of our interest. Each during the period of its acquisition demanded an effort and an attention which was freely given, and in return gave to us a further step in self-knowledge.

All mental phenomena develop through an ascending series of stages, and on the capitalization of our acquisitions by habit depends the possibility of the passage from stage to stage. The development of feeling in the form of sense-perception brings the child to a knowledge of the outside world, to the formation of ideas, and so to his intellect. On the other hand, with the progress of sense-perception, the more complex feelings and emotions are excited, recognized, and interpreted by the growing intelligence, judged as desirable or undesirable, and translated into action by the will. Similarly, acts which have been reflex and instinctive are learned, understood, chosen deliberately, and, it may be, forged by frequent repetition into habits—habits which may be performed as automatically as instincts, yet carry with them the moral value of acts of will.

The Formation of Habits.

Educators lay down certain maxims which may guide us in the formation of habits. The first of these is that one should begin early. The advantage of this is that the plasticity of the nervous system is greatest during the early years. Moreover, by beginning early we may forestall the formation of bad habits, which might otherwise form an obstacle to the formation of those we wish to establish. At the same time one should not begin too early. There are habits appropriate to each stage of development, and it is important that these should be acquired in their natural sequence. For example, sense-training must come before rational thought. A young child who is allowed to argue about everything instead of doing as he is told, far from developing a habit of intelligent foresight, will miss much present enjoyment, and will lay up many difficulties for the future.

A second maxim is that the formation of a particular habit will be greatly assisted by a strong motive force at the outset. Such a motive may be extrinsic or intrinsic. Extrinsic motives, such as rewards and punishments, love of approval, and the like, have their value as incentives, but they should be used so as to reinforce, and not to overshadow, the intrinsic. The great thing to be aimed at is to produce a strong inclination in the child's mind towards the habit to be formed. This is Nature's method of teaching. All the normal propensities, impulses, interests of children, are the indications of some want which is being felt. They imply the presence of power. The aim of education should be to get this power at the back of a desired end, by showing the child how legitimate satisfaction for his impulses may be gained.

A third maxim is 'never to lose a battle.' A habit is easily formed if one can secure uninterrupted continuity of performance. No exceptions should be allowed to occur. This is frequently a difficult rule to carry out, but it is a very important one. Any ingrained habits become pleasurable in course of time. Even actions which are disagreeable at first lose their irksomeness when they become habitual. Hence, every conception which occurs while such an act is becoming habitual prolongs the feeling of irritation.

It is well to remember that in forming habits both time and repetition are necessary. Repetition, indeed, takes time. But, further, inasmuch as habits depend upon an organic basis, time is needed for growth and adjustment. Such growth and adjustment take place, not only during the successive acts which build up the habit, but apparently in the intervals of rest. In the case of physical habits, such as those involved in golfing or skating, one often finds that, on resuming after a night's rest, one seems actually to have improved during the interval. So likewise with habits which are not physical. They also are built up, through time and repetition, by small additions from day to day.

As to the actual formation of habits in childhood, I cannot agree with those psychologists who tell us that 'in all true habits the will is the starting-point, and a purely voluntary action at first takes place.' On the contrary, purposive and conscious intention has played only a very subordinate part in the development of our first formed habits, although its scope does become gradually more and more important in the acquisition of the habits which are grafted upon these.

It would be interesting to take up seriatim the various native reactive tendencies which were discussed in the last chapter, and to show how they may be utilized by the educator for the formation of habits. I have shown in other parts of this book how the child's early motor tendencies lead to the formation of those habits which are the essential basis of perception, of locomotion, of articulation. In a similar way one might consider the curiosity, the imitativeness, the acquisitiveness, the secretiveness, the combativeness, and the numerous other natural propensities of children, all of which, in ways which can be influenced by environment and by training, play their part in weaving that character which has been defined, not inaptly, if not quite adequately, as a 'bundle of habits.' A discussion of this sort, however, would be more appropriate to an educational text-book than to a work dealing with child-study.

CHAPTER XIV

THE INTERESTS OF CHILDREN

'The world is so full of a number of things,
I'm sure we should all be as happy as kings.'

STEVENSON.

LITTLE headway can be made in teaching any subject until the pupil's interest has been awakened at least in some degree. As George Eliot remarks in *The Mill on the Floss*, 'for getting a fine growth of stupidity there is nothing like pouring out on the mind a good amount of subjects in which it feels no interest.' It should, therefore, be the aim of the educator either to choose such subjects of instruction as will excite the interest of the mind to be educated, or to devise some means of rendering the subjects chosen interesting. That a certain measure of success in achieving the latter object may be obtained very simply is shown by the widespread adoption of a means which lies ready to hand. I mean by making the acquisition of the required knowledge the only means of escape from chastisement. Such a rough-and-ready method, however, in spite of the popularity which it has attained, has many obvious disadvantages, the greatest of which is that the interest so obtained is entirely extrinsic to the subject of instruction. The more it comes to be realized that in education the development of the mind is of greater importance than the mere acquisition of knowledge, the more will the force of this objection be admitted.

Whatever part purely extrinsic interests, such as rewards and punishments, are capable of playing in education, the teacher will be most successful who succeeds in awakening in the mind of the pupil a strong attraction towards the subject of instruction. Education, in the popular parlance of the present day, is the science of interesting, and its chief end is the strength and variety of the interests aroused.

In former days lack of interest in school-work was regarded as a fault of the pupil. A backward, or stupid, or lazy child was blamed for taking no interest in his lessons; and if it was discovered that the child took a keen interest in other things, and was eager in the pursuit of knowledge in subjects not acknowledged by the school, this was regarded as an aggravation of the offence. The account Smiles gives in his *Life of a Scottish Naturalist* of the school-days of Thomas Edwards, and of the manner in which Tommy's schoolmasters dealt with his efforts at nature-study, is a case in point. An example like this will suffice to bring before us the important fact that there are some subjects which appear to be naturally interesting, and others which do not. This is where we find the connexion between interest and instinct, for a naturally interesting subject may be defined as one which appeals to, or which affords satisfaction to, our innate impulses and instincts, while an intrinsically uninteresting subject does not. Subjects, however, which are natively uninteresting may acquire interest by being brought into relation with some of the things which are natively interesting. This, however, must be a matter of time, and it is of great importance to the teacher to be able to find out what things are naturally interesting to the child, and then little by little to associate with these the later ideas he desires to teach.

In this the aim of the teacher should not be simply to follow the child's native interests, and to give them sufficient stuff to feed upon, for this, in the case of a child with some marked bent, might result in a one-sided development. The aim of the teacher should rather be to open up to the child a determinate circle of interests expanding in all directions from the childish interests already there, the latter becoming gradually relegated, with the widening of the horizon, to a position of due subordination. In other words, the teacher should use the child's native interests as a leading-string, but he should also have a very definite idea of the direction in which he wishes to lead.

The practical importance of interest in education is, however, a subject which I cannot pursue further. I have, I hope, said enough to explain the fact that the interests of children have been a very favourite subject of investigation among students of childhood. I propose now to consider some of the lines on which such investigations have been carried out.

In the various biographies of young children which have been published, the awakening of interest naturally receives a good deal of attention. The earliest object of attraction to young children are bright surfaces, such as a flame, or a window, or a gilded picture-frame with light falling on it. Bright moving objects, such as the faces of people moving about the room, also attract attention, and throughout childhood anything in movement is sure to excite interest. The intense interest most children take in locomotives, for instance, probably springs from the large size and rapid motion of the train.

Although bright colours by their brightness attract attention early, the differentiation and recognition of the various colours does not seem to begin so early nor to proceed so rapidly as the differentiation and recognition of form. I shall refer in a little to some of the researches which have been made on the development of the colour sense.

Sounds form an important centre of interest to young children. Preyer's baby first turned towards a sound heard in the 12th week, Darwin's in the 17th, and Hall's in the 21st. A good example of the way in which sound may awaken interest is given by Preyer. On the 319th day the baby was striking a plate with a spoon, when the hand that was free accidentally touched the plate. The sound was dulled, and the child at once noticed the difference. He then took the spoon in the other hand, struck with it upon the plate, dulled the sound again, and so on. In the evening this experiment was renewed with a like result. Evidently, says Preyer, the function of causality had emerged in some strength, for it prompted the experiment.

The reactions of young children to music vary very much. Preyer's baby showed pleasure in music during the first three months, which increased very much during the following six, but 'it was nearly the end of the second year before the child, who was roused to the liveliest movements by hearing the most varied kinds of music, performed these movements in time. He did, indeed, dance, but in his own fashion, not rhythmically (twenty-first month). It was absolutely impossible, notwithstanding much pains, to teach the child to name rightly even the three notes C D E (end of third year), though his hearing for noises and vocal sounds was in general acute.'

'Another child, on the contrary, a girl, could in her ninth month sing correctly every note given her from the piano, and seemed to find discords unpleasant; at least, she always wept bitterly at that age whenever anyone blew on a small tin trumpet. This child and two others of the same family could sing before they could talk, and sing correctly airs that had been sung to them. Not only the pitch, but the stress and the shade of tone, are given by such musical children (in the eighth month) who listen to all music with the greatest strain of attention.'

In the *Parents' Review* for 1896 there is an account of a remarkable 'musical baby.' This child is said to have shown the first sign of musical intelligence at six weeks, when he always laughed if the drinking-song from *Cavalleria* was whistled, but took no notice of any other tune. From this time onward the baby heard the best music for a short time every day. At eighteen months, before he could speak, he commenced to sing, his first efforts being *Wot 'Cher*, and the march from *Faust*. At two years the child named the composers of the pieces he knew, saying, Ru-ben-stein, Bach (with great emphasis on the guttural), Wagner, etc. 'Shortly after this I discovered, quite by chance, a strange fact. In turning over the pages of a song-book, the baby named each song that I passed—*Nancy Lee*, and so on. How can this be? I thought; he cannot read the names printed at the top. Turning hastily to my Beethoven sonatas, where each page looks alike, I found, to my surprise, that this small child of two and a quarter named correctly every sonata that I came to, and in cases where there was no distinctive title he hummed the opening bars. It was only to be explained by the fact that I always placed the right music on the desk when playing to him, and the score had impressed itself on his mind like a picture.'

Many scattered observations upon the kinds of interest to be noticed in babies are collected in a paper by G. Stanley Hall entitled *Early Sense of Self*,[1] in which he

[1] *Amer. Journ. of Psych.*, vol. ix., 1898.

deals with the outward and visible signs of the gradual differentiation of the 'me' from the 'not-me.' A scientific study of the phenomena thus summarized by Tennyson:

> 'But as he grows he gathers much,
> And learns the use of "I" and "me,"
> And finds "I am not what I see,
> And other than the things I touch."
>
> 'So rounds he to a separate mind,
> From whence clear memory may begin,
> As thro' the frame that binds him in
> His isolation grows defined.'

Stanley Hall notes the appearance of successive periods of interest in different parts of the body. The hands and fingers attract attention some time between the second and the sixth month. The feet are discovered later than the hands, and as the baby is now noticing more things, the fact of discovery is more marked, and the child may spend much time examining, biting, or playing with the feet and toes. The various finger and toe games help the development of this sort of consciousness. A period of great interest in the fingers and toes of other people is often noticed. Sometimes the discovery of the feet is an occasion of fear.

The knees are sometimes definitely discovered by infants a year or more in age. The *ears*, *nose*, *eyes*, *hair*, may also excite great interest. The *tongue* is felt, protruded, sucked, bitten, pulled, and experimented with in various ways. Licking objects is a common form of experimentation.

The development of dermal consciousness, and the part played in development by washing, dressing and undressing, etc., are noted. Between three and five children often discover that parts of their bodies are hard, and when told that these hard things are their bones, they may give way to fear—that they will fall and get broken, that dogs will eat them, that they have a horrid skeleton inside.

The influence of dress, of the mirror, of names, and other subjects are also discussed in their bearing on self-consciousness, but I have probably said enough to show how scattered observations on young children may be brought together by their relationship to some larger problem.

So far as we have gone, we may say that the natural interests of young children lie wholly in the sphere of sensation. Bright things, coloured things, things that move, things that make a noise, things that in some way or other *do* something—these are the objects that attract their notice and excite their interest. As their powers of observation increase so their interests multiply, and soon become so numerous that they can only be followed out in detail by separate studies; but we continue to find throughout childhood that the things that are interesting are the things which afford satisfaction to the native impulses.

Let us now turn our attention to some of the studies which have been made upon individual interests. In the first place let me give a short summary of various observations which have been made on the recognition of colour by children. Children are so universally fond of bright colours, and show so marked a preference for coloured rather than plain articles or pictures, that this subject has naturally attracted a good many observers.

The first experiments which were carried out on this subject were those of Professor Preyer, who, in his book on *The Mind of the Child* (1881), gives the results of 1,486 judgments of colour made by his child, who was two years of age when the experiments began, and nearly three when they were completed. Preyer followed two methods in his experiments. He showed the child a few colours, and taught him their names, and then either asked him, 'Which is the red, the blue?' and so on, or pointed out the colours, asking, 'What colour is this?' In the table which Professor Preyer gives, at the thirty-fourth month, showing the total results of the judgments, the order in which the colours were found to be most frequently correctly named was as follows: Yellow, brown, red, violet, black, rose, orange, grey, green, blue.

Of the four principal colours, it will be noticed that *yellow* and *red* were named correctly much earlier than *green* and *blue*. The low place taken by green and blue was due, says Preyer, to a tendency to confuse these colours together, and not to any difficulty in associating with them their proper names; for if green and blue were as distinct in his sensation as yellow and red (which had been distinguished correctly for months), there would have been no occasion for his giving them wrong names.

Miss Milicent Shinn repeated Preyer's observations upon her niece during the third quarter of the child's second year.

Her results range the colours in the following order: Pink, orange, black, green, yellow, blue, brown, white, violet, red.

This result differs widely from Preyer's. Red, for example, named correctly in Preyer's list 86·7 per cent., was correctly named by Miss Shinn's niece only 59·4 per cent. Miss Shinn thinks yellow was her niece's favourite colour, yet it is only fifth in the list, while it is first in Preyer's.

It is evident that in experiments carried out by Preyer's method a child may readily be confused, not by the colours, but by their names. It might, for example, be possible for a child to pick out a colour named to him before he could remember the name of a colour shown to him. Binet, realizing this source of confusion, made a series of observations by both methods and kept the results separate.

When the child named the colour the percentages of correct answers were: Orange and blue, 100; red, 97; green, 83; maroon, 75; violet, 70; rose, 64; white, 33; yellow, 30.

When the child pointed out a colour when the name was given: Red, 100; maroon, 94; blue, 92; rose, 89; orange, 86; violet, 71; white, 68; green, 66; yellow, 58.

These show clearly that the word element makes a distinct difference in the results obtained.

Accordingly Binet[1] has suggested another method of experiment in which the colour need not be named at all. The colour is shown to the child, mixed up with several others, and the child required to find it again. By this method the confusion arising from words is avoided; but there is still a possibility of the child making mistakes from not understanding what is required (*e.g.*, whether to pick out the same colour, or one like it, or one equally bright or equally pretty), or giving wrong answers in the spirit of mischief.

Another drawback to all these methods is that they are of no avail in the case of very young children.

Professor Baldwin has tried to overcome these objections in a series of ingenious experiments which he began when his baby girl was nine months old. He bases his experiments upon the infant's tendency to reach out towards any attractive object. The child's reaching movements, accordingly, he took as an indication of her sensi-

[1] *Revue Philosophique*, vol. xxx., p. 589.

bility. Pieces of coloured blotting-paper were placed before the child, at certain definite distances, one at a time, and a record was kept of the number of times she reached out towards each. The proceedings were regarded as a game by the child, who enjoyed it greatly. Altogether the experiments were continued for six months.

Baldwin's results differed somewhat according to the different distances at which the coloured paper was placed, but, taking all the observations together, he places the colours in order of attractiveness as: Blue, red, white, green, brown. Unfortunately, Baldwin did not include yellow among the colours experimented with.

These examples may suffice to illustrate some of the simpler kinds of experiment. They illustrate, also, how experiments devised to aid observation lead to criticism, and how the criticism leads to the devising of better methods of experimentation.

Children's Interest in Objects.

Binet's Studies.—In December, 1890, Alfred Binet published in the *Revue Philosophique* sundry observations made by him on his two little daughters. His paper is very interesting and suggestive, and part of it especially has led other observers to make similar studies. The part I refer to deals with the children's notions of familiar objects when they were at the ages of about two and a half and four and a half respectively. From such notions or ideas the author sought to determine the prevailing lines of the children's interests.

The method of procedure was to ask each little girl separately what certain common objects—a knife, a horse, a lamp, etc.—were. The child was simply asked the question, What is a knife? etc., without the object being shown, and the reply was taken down. After a sufficient interval the same questions were asked again, and this was repeated a number of times, all the replies being preserved.

Let me cite a few of the answers made by these children to the queries.

What is a *knife?* 1. A knife, it is for cutting food. 2. A knife, it cuts the food. 3. A knife—that is to say, something which cuts. 4. A knife, it is for cutting food.

A *horse?* 1. It is for drawing a carriage with a gentleman inside; then the coachman whips the horse, and then the horse runs. 2. It runs, it bites. 3. It is something which walks. 4. A horse, it is for running.

A *lamp?* 1. It is for lighting that one may see clearly in the room. 2. It is something which gives light, which makes (one) see clearly. 3. A lamp, it is for seeing clearly.

A *clock?* 1. One puts it on the chimneypiece to see what time it is. One says it is half-past three. 2. It is for seeing the hour. 3. Ditto.

Bread? 1. It is for eating. 2. One eats it. 3. It is for eating. 4. Bread, it is for eating. 5. It is for eating.

A *bird?* 1. It flies in the air, it sings. 2. It flies in the sky. 3. A bird, it is for flying. 4. Ditto.

Binet says that, although his questions invited a definition of things, or a definition of words, it is evident that a little child is incapable of defining. Definition presupposes practice (*travail*) in reflection, comparison, elimination. The little children studied reply without reflecting. Their reply reflects the first images raised in their minds when one names something known to them (*cf.* definitions of horse and clock given above).

Comparing all the replies together, Binet concludes (1) that children are impressed much less by the visible aspects of things than by their uses—a chair is for sitting on; (2) that their ideas possess only slightly abstract characteristics. It is the exception to get a disinterested and artistic description. He notes also the tendency of the child to reply by some formula—'pour,' 'ça veut dire,' 'c'est quelque chose que . . .'

Binet's paper suggested to other observers that it would be interesting to carry out a similar study upon school-children. This was first done by Earl Barnes, who, in 1892, collected a large number of children's definitions of common objects by means of a list adapted from Binet. The same list was subsequently used for another study by Professor Edward R. Shaw, and still later the Edinburgh Branch of the British Child-Study Association adopted the same means for testing children in the Edinburgh Board Schools. We shall consider these observations at some length as an example of the method of studying children by means of a syllabus.

1. *Earl Barnes' Studies.*—The data were obtained from school-teachers, who gave the children the following directions as an exercise in written work:

Write at the head of your sheet the name of your teacher, your own name, and your age. What is a

knife	mamma	earthworm
bread	potatoes	shoes
doll	bottle	finger
water	flower	clock
arm-chair	snail	house
hat	mouth	wolf
garden	lamp	omnibus
piece of sugar	bird	balloon
thread	dog	village
horse	carriage	box
table	pencil	handkerchief.

The circular asked the teachers not to give any other directions; not to ask the children to define a *horse*, or say what a horse can do, or anything of the sort; nor to tell them what was to be done with the work, nor to ask them to be careful, etc.

Returns were sent in from more than 2,000 children, and the papers of fifty boys and fifty girls of each age from six to fifteen inclusive—*i.e.*, 1,000 in all—were taken on which to base the generalizations.

An examination of the papers sent in showed that the answers could be grouped under the following general heads:

Use—A clock is to tell the time.
Larger term—A clock is a time-piece.
Action—A clock goes tick-tack.
Quality—A clock is pretty.
Colour—A clock is yellow.
Form—A clock is round.
Structure—A clock has a face and wheels.
Substance—A clock is made of wood and iron.

Often a single answer would give several attributes of the object. In such a case the different statements were collated separately. In all 37,136 statements were collated.

The results obtained indicate that in seven-year-old children the definition of *use* greatly preponderates over all others. This agrees with what Binet found in his children. Little children tell you what a thing is good for, or what you do with it—'A horse is to ride,' 'A dog is good to catch flies,' 'Bread is to eat.' A few give some larger term—'A dog is an animal'—or give actions—'A dog runs,' 'An earthworm flies round the earth.'

At eleven years *use* still leads, but *larger term* has become quite important, and *substance*, *action*, *place*, and *structure* have gained considerably in prominence.

At fifteen years *larger term* leads, *use* comes second, *substance* and *structure* are fairly prominent, while *action* is insignificant.

Professor Barnes admits an objection that has been made to his list of words—that they are not typical, and do not give sufficient occasion for the appearance of certain qualities, such as colour. He accordingly prepared a new list, arranged to give more prominence to colour, form, substance, and structure, but he found as he worked with the results obtained that he was getting simply what he was 'reaching for.' Accordingly, he believes that the random list of Binet is better than any list of selected words.

Barnes' conclusions may be stated briefly:

(1) Children's interests develop according to pretty definite laws.

(2) In our natural history and object-lessons with young children we should begin with the uses and activities of objects if we wish to appeal to the children's interests, instead of starting with their superficial qualities—colour, form, etc.

(3) We must not expect from young children elaborate conceptions of the things about them.

(4) In ability to express what they know the girls of Monterey County are in no way inferior to their brothers.

2. *Shaw's Studies*.—Professor Shaw, in the *Child-Study Monthly*, 1896, published the results of his work on children's interests. He made use of Binet's list also, but in a different fashion.

(1) Only about seven words were given to the children at one time, so that it required four or five exercises to work through the list.

(2) The word was named and written on the board, the children having been told to write down as rapidly as possible whatever came into their minds. This method was suggested long ago by Francis Galton, who made use of it in studying 'association.'

The work was classified under a larger number of headings than Earl Barnes made use of. There was also an important difference in the manner in which the attributes were classified under the terms *use* and *action*. Where anything was said to be used by being put into action for the benefit of the individual, Shaw classified the statement under action. *Use* was reserved for statements which evidently implied general use. Thus, 'I drink water' is referred to *action*, 'Water is necessary to man' to *use*.

Professor Shaw's tables include a total of 59,233 attributes (from 600 children) as compared with 37,136 from 1,000 children in Earl Barnes' returns. For the same ages as in Shaw's investigation, Barnes' table shows 22,203 attributes. This great discrepancy is evidently due to the different methods made use of in obtaining the data.

As to the general results obtained, Shaw says that one point specially worthy of notice is that the young child's interest in objects is self-centred, as opposed to the older child's recognition of general use. This is not indicated in Barnes' tables, although Professor Barnes also recognizes the fact when he says, 'To the young child all things exist to meet some of his particular wants, thus—" A village is to buy candy in," " A bird is to make meat with," " A wolf is good to get its hide" '; but Professor Shaw in his collation does not recognize such individual personal interests to signify use. On this account we find a marked difference between the two sets of tables. In Barnes' tables there is a greater proportion of attributes of *use* in the statements of the younger than in those of the older children (79 per cent. at six; 33 per cent. at fifteen). Shaw found the exact opposite, the terms *use*, *useful*, *good for*, *valuable*, etc., being common with the advanced pupils, rare with the younger.

On the other hand, *action* shows 4 per cent. for Barnes' collation to 21 per cent. for Shaw's. Shaw's table, based on his total returns, shows that attributes indicating *action* are nearly double those indicating *use*. Action is particularly prominent in the boys' papers as compared with the girls'.

These discrepancies illustrate in a very interesting way how great a difference in results may arise from a slight divergence in the significance of the terms used. Shaw's method of classification certainly brings out more clearly than does Barnes' the fact admitted by Barnes that children seem to be more interested in the dynamic than the static qualities of objects.

This is a point which Binet does not appear to have noticed, though it is quite evident in the replies of his children which he prints. The child's phrase, 'It is for . . .' he interprets as signifying use, as, indeed, it would if used by an adult; and he remarks, 'What could be more utilitarian than the definition of a snail?' What the child said in reply to the question, 'What is a snail?' was 'It is for crushing that they may not eat the lettuces ("salad") in the garden.' But did the child really mean to imply *use* by this answer? It seems to me that the child did not mean to tell what the use of a snail was, but what one did with it when found, probably recalling some actual event. *Action*, not *use*, is implied in the answer, and this is indicated more clearly in the reply given the second time the question was asked: 'They eat the lettuce ("salad"), and then one crushes them that they may not eat it in the garden.'

From all these results, then, it appears that children, and especially young children, are not so much interested in the appearance of an object, or its colour, or structure, or form, as in what it does or what it affords them the opportunity of doing.

Observations on Edinburgh Children.

The same series of observations has recently been carried out upon a number of Edinburgh children. Owing to the fact that we could not procure a sufficiently large number of papers from the younger children, we contented ourselves with examining the papers of twenty boys and twenty girls of each age from eight to thirteen, against fifty examined by Earl Barnes and Shaw. We had thus 240 papers against their 600. In order to compare our results with theirs I have multiplied the totals by two and a half in the comparative tables. When this is done we find that the Edinburgh children mentioned a total of 22,312 attributes, as compared with 22,303 in Earl Barnes' returns for the corresponding ages. Our papers were written according to Barnes' directions—that is to say, as a single exercise. Shaw, who made the list the subject of four or five separate exercises, collated 59,223 attributes.

When we compare the Edinburgh with the American returns, we find that they follow almost the same lines as those of Earl Barnes. If we arrange the classes in order of magnitude, we find that the general arrangement of the groups is very similar; thus, in both cases, *use* is first, *larger term* second, and *structure*, *form*, and *colour*, seventh, eighth, and ninth; the other groups occupying the intermediate positions. Under *action* we have more than twice as many as Barnes, but doubtless counted some definitions *action* which he would have counted *use*. For example, 'A horse is for running' we counted action. The *form* of the answer suggests *use*, but the child is telling us what the horse does.

If we add use and action together, we find: Edinburgh, 10,949; Barnes, 11,085. Perhaps the most striking difference is in the number of qualities, which, however, is a rather vague term: Edinburgh, 2,457; Barnes, 985. It is worth while noting how, in one return, the number of qualities steadily increases with the age:

Age:	7	8	9	10	11	12	13
Boys ..	30	50	66	106	111	124	467
Girls ..	42	48	70	134	106	116	516

This increase in qualities with age may be graphically represented thus:

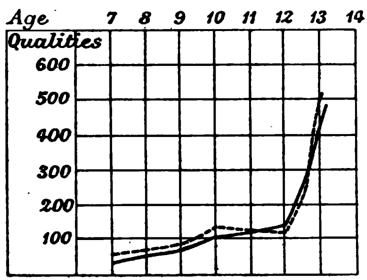


FIG. 5.—TABLE SHOWING THE NUMBER OF QUALITIES MENTIONED AT DIFFERENT AGES. BOYS ——— GIRLS ------.

Note the steady but gradual rise up till the age of 12, and the very rapid rise at the beginning of adolescence.

On the whole, our results agree so closely with those of Earl Barnes that they obviously confirm his deduction that children's interests develop along fairly definite lines.

To his dictum that in object-lessons the greatest emphasis should be laid upon *use* we would add that to

TABLE I.

EDINBURGH CHILDREN.

RETURNS FROM 20 BOYS AND 20 GIRLS OF EACH AGE.

Boys = upper number; girls = lower number.

To compare with Earl Barnes' Tables multiply by 2½.

Age:	8	9	10	11	12	13	*Total.*	
Use	305 319	258 328	348 353	237 263	276 264	268 320	1,692 1,847	3,539
Larger term ..	114 123	122 115	104 74	119 94	126 92	194 214	779 712	1,491
Action ..	58 58	89 60	64 72	77 90	62 87	68 56	418 423	841
Quality ..	30 42	50 48	66 70	106 134	111 106	124 116	487 516	1,003
Place	27 26	47 35	26 40	60 44	45 46	47 75	252 276	528
Colour ..	3 1	0 2	2 1	0 0	0 1	2 3	7 8	15
Form	1 0	6 1	2 1	1 0	3 2	8 8	21 12	33
Structure ..	16 19	36 27	26 36	69 31	41 47	88 55	276 215	491
Substance ..	40 33	40 30	38 34	75 59	61 44	78 39	332 239	561
Unclassified ..	70 60	32 33	23 37	30 16	33 42	23 24	211 212	423
Totals ..	1,345	1,359	1,417	1,505	1,489	1,810	8,925	

Table II.

CHILDREN 8 TO 13 INCLUSIVE.

	Barnes.	Shaw.	Edinburgh Children.
	Per Cent.	Per Cent.	Per Cent.
1. Use	−50	−12	38·5
2. Larger term	−16	2+	16+
3. Substance	−9	8+	6+
4. Structure	4+	−9	5·5+
4. Place	−5	−6	5·5+
6. Action	4+	−22	9+
7. Quality	4+	14+	11+
8. Form	−2	1+	·3+
9. Colour	·4+	−3	−·2
Unclassified	6+	1+	3+

Table III.

240 EDINBURGH CHILDREN × 2½ TO COMPARE WITH 600 AMERICAN CHILDREN (EARL BARNES).

	Edinburgh Children. (*Total qualities*, **22,312**.)		American Children. (*Total qualities*, **22,303**.)	
Chief Groups:				
(1) Use and Use Action ..	8,847	.. ..	10,115	(1)
(2) Larger term	3,727	.. ..	3,470	(2)
(3) Quality	2,507	.. ..	985	(5)
(4) Action	2,102	.. ..	970	(6)
(6) Substance	1,302	.. ..	1947	(3)
(7) Structure	1,227	.. ..	959	(7)
(5) Place	1,320	.. ..	1,012	(4)
(8) Form	82	.. ..	370	(8)
(9) Colour	37	.. ..	95	(9)

young children use is individual and personal—'A box is for making wood.' The idea of general use develops later.

We also agree with Shaw that action is a more prominent interest than Barnes' method of classifying shows.

Thus such statements as 'Potatoes are for putting in soup,' or 'A table is for sitting at,' indicate an interest in what one does with an object rather than its general utility.

In a few of our papers one particular form of interest greatly preponderates over all others. Thus, one boy tells us, 'A knife is made of steel, shaped; bread is made of do; a doll is made of stuccy and sawdust;' and so on through the list. Does this indicate a definite line of interest, or was the child simply using a formula?

CHAPTER XV

FORMS OF EXPRESSION

'I was no longer a speechless infant, but a speaking boy.'
ST. AUGUSTINE.[1]

A. SPEECH.

IN one of the most interesting chapters of his *Ascent of Man*, Professor Henry Drummond pictures the primeval mother bending over the hollowed cradle in the forest for the first smile of recognition from her babe. Every mother since then, he tells us, has been an unconscious evolutionist, and every little child a living witness to ascent. If in the baby's smile the mother sees the dawn of intelligence, it is because her faith looks forward to that moment of supreme interest in mental development when the child shall utter its first imperfect words, and by means of speech and gesture communicate its wants to those who care for it. Then shall be formed a new bond between mother and child, and those ties which developed in the early months of helpless infancy be wondrously deepened and strengthened.

There is something so inherently attractive in the babblings of infancy that it is little to be wondered at that 'baby linguistics,' to adopt Sully's phrase, should have become a favourite study amongst the modern observers of children. Moreover, the child's early utterances are not only forced upon our attention, but they are

[1] *Confessions*, I. The whole passage is worth referring to.

capable of being very accurately and systematically recorded. Even those who are not constantly with the child, but who see it only for a limited time every day, may be able to keep a tolerably complete diary of the progress which is being made, and the stages through which the art of speech is acquired.

To the scientific inquirer the earlier stages in the development of speech are of particular interest, and in recent years much attention has been bestowed upon the child's first essays in the use of vocal symbols. Most of the writers whose biographic memoirs of individual children have been referred to in other chapters have discussed pretty fully the gradual evolution of true articulate speech from the early babbling, and their observations throw light on problems which have caused discussion for ages.

Before attempting a brief description of a few points of interest in the acquisition of speech by the baby, it may be well to consider briefly whether we can obtain any useful hints by a study of the lower animals.

Speech is rightly enough regarded as the great prerogative of man, and among the lower animals we find nothing that at all approaches the complexity of fully developed human speech.

Still, many of the animals are able to a slight extent to communicate with one another. Ants seem to be able to convey intelligence of some sort by means of their antennæ. Many gregarious animals, by means of sounds and movements, are able to indicate the presence of danger and the direction from which it comes. Birds, also, certainly communicate with one another. The dog, to quote from Darwin, 'since being domesticated, has learned to bark in at least four or five distinct tones. Although barking is a new art, no doubt the wild parent-species of the dog expressed their feelings by cries of various kinds. With the domesticated dog we have the bark of eagerness, as in the chase; that of anger, as well as growling; the yelp or howl of despair, as when shut up; the baying at night; the bark of joy, as when starting on a walk with his master; and the very distinct one of demand or supplication, as when wishing for a door or window to be opened.' Monkeys have long been known to make a number of different sounds expressive of various emotions, and it may be of interest to quote Mr. R. L. Garner, who is the greatest authority on monkey language: 'The sounds which monkeys make,' he says, 'are voluntary, deliberate, and articulate. They are always addressed to some certain individual with the evident purpose of having them understood. . . . They wait for and expect an answer, and if they do not receive one they frequently repeat the sounds. They usually look at the person addressed, and do not utter these sounds when alone or as a mere pastime. They understand the sounds made by monkeys of their own kind when imitated by a human being, by a whistle, by a phonograph, or other mechanical device. . . . The fundamental sounds appear to be pure vowels, but faint traces of consonants are found in many words.' 'As a rule each act of a monkey is attended by some word.' In a later work, after study of the apes in their native haunts, Mr. Garner says the chimpanzee has a vocabulary of twenty-five or thirty words; he himself learned ten of these words, and could by this means communicate with the animals using them.

Animals, then, by their movements, by their attitudes, by their cries, are able to express the emotions which they feel—to express them in such a way as to be understood by others. To say this is to say that they have speech;

and when we find that some of them have actually a vocabulary of thirty sounds to which they attach more or less definite meanings, it requires no argument to show that you have only to evolve this sufficiently far to get the language of human intercourse. The interest of all this to us is that the study of animals shows us that the simplest language, as it exists among them, is a language of signs, of gestures, of sounds indicative of emotion, of a speech which may express more definite information, such as the direction in which food is to be found, or from which danger is to be feared. Moreover, the language of animals is one which is easily understood, both by other animals and by men. The chicken instinctively fears the cry of a hawk. The child instinctively fears the dog which growls. A bird in a tree cries, 'Look out! there's something coming,' and all the deer or sheep in the neighbourhood jump to their feet and look round, prepared on the instant to run for their lives.

Some of these facts are of much interest in connexion with the first language of the human child. The child brings with it into the world the apparatus necessary for speech—it brings with it, that is to say, a tongue and lips, a larynx, and lungs. Yet it does not speak. And the reason for this is, I suppose, twofold. In the first place, it has no voluntary control over the mechanism of speech. In the second place, it has nothing to say—it has no ideas.

It is true that the first act of the infant at birth is to cry aloud. It is true, also, that a great philosopher has described this cry as a cry of indignation and wrath. But in truth such an interpretation is purely fanciful. The cry of the child at birth is certainly a purely reflex act due to the stimulation of the respiratory centres, and without any emotional content whatever. It is not very long, however, before the child's cry does begin to vary a little with the varying physical or emotional conditions which call it forth, and when the infant is only a few weeks old it may be possible to differentiate between cries due to hunger, to pain, to cold, or to discomfort. If these various cries are understood, and promptly attended to, as of course they ought to be, the child will soon recognize this, and will spontaneously begin to make use of certain sounds to indicate his wants.

A further step is taken when the child begins to make use of articulate sounds. These are uttered freely by the time the infant is a few months old. At first the vowel sounds very greatly predominate, and may for a time be used exclusively. The order in which these sounds appear seems to vary very much in different cases. Consonants are very soon added to the vowels, and in most cases the earliest to be used are *b*, *p*, *m*. *T* is often used early, as are the gutturals *k* and *g*. These consonants are at first used at the beginning of syllables—*ba*, *pa*, *ma*—and there is a strong tendency to repeat the sounds uttered—*ba-ba*, *pa-pa*, *ma-ma*. To a very large extent these sounds seem to be used as a species of play; at any rate, they have no definite significance, but are to be regarded as an outpouring of the child's innate motor energy. Nevertheless, they certainly serve the purpose of affording practice to the organs of articulation, and the majority or all of the sounds thus spontaneously uttered by the child will subsequently enter into the composition of various words. Some sounds, however, are used interjectionally, indicating emotions such as surprise.

At this period, then, still within the first six months, the child already possesses a sort of language consisting of sounds and signs. It is a language of a primitive character, which is expressive of states of feeling, or of physical wants, and is perfectly intelligible not only to the child's own relations, but to any human beings whatever. I mean that a young infant, at this stage of its development, expresses its feelings by its gestures, by its attitude, by its expression, and by the sounds which it makes in such a way as to be readily understood by anyone who is present. The child has no articulate speech or language, but anyone who is watching it can tell whether it is pleased, or angry, or frightened, or surprised; whether what it sees excites desire or aversion; whether what it tastes pleases it or not. Now, these significant gestures, attitudes, sounds, and so on, are obviously a kind of language. It is not French; it is not German; it is not English. It is intelligible alike to English, French, or German. It is, in short, a kind of language which some writers go so far as to regard as the primitive language of the species—and perhaps in some sense this is true.

During the second six months of life we find that a very marked advance takes place. This advance is, perhaps, greatest in the understanding of what is said. A child of less than a year old will recognize the names of a great number of common objects, and will understand simple sentences which are addressed to him. Very often no definite words are spoken during this period, but as a rule the child takes a delight in imitating various sounds. About a third of the sounds used are interjections, and nearly another third are onomatopoetic. Duplicated syllables are very common—*ba-ba*, *ma-ma*, *pa-pa*—now used with more definite significance than in the preceding period. This imitative tendency is naturally of great importance for the learning of speech, and if anything should occur to interrupt it, the result is likely to be a considerable delay in the progress. I may quote a curious illustration of this, which was reported recently in a medical paper. A baby of a year old had an attack of diphtheria, and it was found necessary to insert a tube into its larynx to enable it to breathe. This tube was worn for thirty-eight days. Before its illness the baby could say 'mamma,' 'papa,' 'by-bye,' and other baby-words, and could imitate the sound of bees, and give an excellent imitation of the sounds made by a neighbouring mill. For the first few days after the tube was introduced it would attempt these sounds. Later on it abandoned all attempts. After the tube was removed it made no attempt to speak for eight or nine months. It could laugh and cry in a perfectly normal manner, so that the delay was evidently of mental origin, and not due to the condition of the larynx.

Most children during this period are fond of music and singing, and some babies can hum simple tunes by ear quite correctly. In this connexion it is of interest to remember that Darwin thought that singing had preceded speech in racial development.

The sounds or words which are used significantly during this period have, for the most part, an emotional content, and very few words expressive of objects are likely to be used, although, as I have said, the child may become familiar with the names of the things he sees about him, a range of verbal associations being thus built up which will find expression at a later date. By the time the child is a year old it is not likely that his vocabulary will exceed a dozen words, and many children do not yet use any. As an example of a child who began to speak at an early age, I may quote from Dr. Hall. The first word to be used by this child was 'by-by' in the 37th week. The next word (291st day) was 'boo-boo,' first said in imitation of a dog, but very soon used in answer to

'What does the dog say?' Great advancement was made in the understanding of words, but no new word was added until he exclaimed 'Papa!' as his father entered the room.

A watch was held to the child's ear, and the words 'tick-tick' sounded in rhythm with the tick of the watch. After listening a moment he repeated 'Chi-chi-chi.' When on the following day (309th) he was asked what the watch said, he answered 'Chi-chi,' a pronunciation which was soon changed to 'Tick-tick.'

Although familiar with the word 'kitty,' it was not articulated until spontaneously used in fright at the sudden appearance of a woolly object which he thought to be a kitty.

'Bath,' 'box,' 'shoe' (326), 'gone' (331), and 'paper' (333) were first imitated, and in a few days used independently. The next word, 'doll,' was used spontaneously when a doll was put into his hands.

The first sentence, 'Papa gone,' though first repeated after his mother, was from that time used independently. 'Mamma' was elicited by the sudden appearance of his mother on the 340th day. 'Gone' now came to be applied not only to persons and objects that had passed out of sight or possession, but also to objects which he wished removed. After eating his dinner he also said 'Gone,' and later, 'All gone.'

Speech in the Second Year.

We now come to the child's second year. During this period a child of normal intelligence advances very rapidly in the understanding of what is said to him. The advance in the use of speech varies greatly, and I have known perfectly intelligent children who did not begin to speak until they entered their third year. As a general rule, however, the child in his second year takes great pleasure in using his vocal organs, and the tendency to imitate all kinds of natural sounds, which we noticed as beginning during the second six months, now becomes very marked. This fact is of interest in connexion with the widely held theory that articulate speech took its origin in the imitation of natural sounds. It seems likely enough, for instance, that primeval man may have indicated the presence of a wild animal, let us say, to his fellows by imitating its growl or roar, and pointing with his finger in the direction in which he saw it. Gesture, of course, continues to be used very largely by the child, and it is extraordinary how young children can manage by means of gesture eked out by a few sounds to indicate a multiplicity of wants. Often a child's gestures are so eloquent that one can scarcely help feeling that it could speak if it liked, and does not do so merely to save itself trouble. Where a child is very long in speaking, the counsel is sometimes given not to be too quick to anticipate its wants or too ready to understand and respond to its signs, and it is quite possible that there may be some value in the advice.

The tendency of the child to save itself trouble, with a lordly disregard of the trouble it may be causing others, is also shown in the tendency to make use of contractions instead of using the whole word. Thus the child may say *ni* for 'nice,' *wa* for 'water,' *bo* for 'ball.' Sometimes it is difficult to tell whether a child's word is a contraction of the real word which the child is trying to pronounce, or whether it is a new word of its own invention. Although it has been denied, I do not think there can be any doubt that children do invent words, and not only invent them, but contrive to impose their use upon the grown-ups about them.

The earlier words used by the child do not have any very clear or definite connotation, and this remark brings us to the very interesting and important subject of the child's power of generalizing. Observation shows that children do from the very first make use of names in a very general way, applying them widely to objects not always very similar. Thus the name 'bow-wow' may at first be applied to all four-footed animals; all men may be addressed as 'da-da'; the word *cŭtie* was applied by one child to anything sharp, and the word *mum* by another to anything to eat.

An apparent generalization may no doubt be due occasionally simply to a failure to distinguish, but probably in most cases the use of a word in a general sense depends upon the fact that the childish perceptions seize upon some striking peculiarity in the object perceived, and whenever this peculiarity is again noticed the associated word is recalled. Before a word can be used in a more definite and specific sense it is necessary that the child's powers of observation should have sufficiently developed to enable it to pick out and recognize the differences between similar objects, and in this the child is undoubtedly aided by its enlarging vocabulary, for things are more easily remembered when we can put a name to them.

The child's use of the word 'da-da' will furnish a sufficiently clear example of the gradual circumscription in the use of a name. The word itself is used first in the babbling period, without any significance being attached to it, but its use by others whenever the father makes his appearance comes in time to be recognized and imitated by the child, and some day when the parent comes into the room he has the pleasure of hearing himself addressed by his offspring. His elation, however, is apt to be short-lived, for he soon hears that when the child was taken out for his walk he joyfully hailed the postman and the policeman by the same title. Now, is this use of the word 'da-da' due to any confusion in the child's mind between the postman and his worthy father? Surely not. The word has been called forth simply by a moving object possessing certain general characteristics, and when other objects with similar characteristics present themselves the child immediately fires off the word with which these characteristics are associated in his mind. The word 'da-da' is, therefore, simply a general name for men. By and by the child finds out that one particular 'da-da' seems to stand in some special relation to himself—and this would imply not merely the growth of his power of observation, but the development of a rudimentary sense of self—and then he learns to apply the name 'da-da' to this one, while the others become men.

The tendency of the child to seize upon some prominent characteristic of an object, and then to apply the name of that object to others possessing a similar character, often leads to curious extensions of the meanings of words, which are not always easy to follow. As Professor Sully gives some very good examples of this, perhaps I may be allowed to quote from his paper. His child had learned to apply the word 'ot' (hot) to his milk or other viands when disagreeably warm. 'When he was seventeen and a half months old, he happened to have placed before him cold milk. On taking it, he at once exclaimed "Ot!" It looked as if the sound now meant something disagreeable to taste, but [as we shall see presently] the boy had another sound ("kaka") for expressing this idea. "Ot" pretty certainly meant something of the wrong temperature. The extremes of hot and cold are, as every one knows, hardly distinguishable; and it seems, therefore, quite natural that he should have extended his vocable so as to cover the new case.

'It is worth noting in connexion with this sound that, like other early sounds, it was probably used with the force of a substantive rather than that of an adjective. C. habitually exclaimed "Ot!" when he saw his food steaming. "Ot" presumably meant for him at this stage a steaming thing liable to excite a disagreeable sensation if taken into the mouth. This was illustrated a month later, when he pointed to an illustration of Guido's *Aurora*, and exclaimed "Ot!" His dull parents could not at first comprehend this bold metaphoric use of language, until they bethought them that the clouds on which the aeronauts are sailing are a good deal like a volume of ascending steam.'

The great majority of the words first used by the child are the names of things, and, as we have seen, these names are at first flung about in a very general way. This tendency to apply known terms to unknown things—to things, that is, whose proper designation is unknown—is, of course, not confined to children, and it appears striking in them only because their vocabulary is so small that they are forced to miscall very familiar objects. A child I know saw some crows alight on the meadows, and exclaimed in excitement, 'Oh, just look at the hens!' Stevenson, in his *Amateur Emigrant*, watching some older children at play on board the steamer, heard one of them say, pointing to a bulwark, 'Go doon to yon dyke.' As the child's vocabulary increases, the application of names becomes more and more restricted, and this restricted use obviously implies the ability to recognize differences of quality between the objects named. Sometimes some particular quality of a familiar object impresses itself so forcibly upon the child's imagination that the familiar name is applied to objects possessing that quality, but differing in every other respect from the object to which the name is properly applicable. Thus a child was so struck by the sharp contour of a dog's face that he applied the term 'bow-wow' to such things as pieces of broken biscuit having a similar outline.

I have said that the recognition of objects necessitates some ability to distinguish qualities, and we must now consider how the names of various qualities become familiar to the child. Perhaps for this purpose we may best select the familiar and attractive quality of colour. The great majority of young children take a great pleasure in bright colour long before they are able to speak, and infants will eagerly stretch out their hands towards flowers, ribbons, and other coloured objects. But coloured objects possess other qualities besides that of colour, and the name of a colour may become quite familiar to a child without his being able to distinguish what special quality of the object is designated. Indeed, the name of the colour combined with the name of the object may simply appear to the child as a sort of compound word—not, of course, distinguished by him as compound—as a sort of compound word or name for the object spoken of. Thus, a child who had made some progress in speech was out with his nurse when a bus came along, and the nurse told the child to look at the big yellow bus. In a short time a carriage and pair (not a yellow one) drove past, and the child exclaimed in delight, ''Nother big yellow bus.' The term 'yellow bus,' perhaps, meant a large vehicle drawn by two horses. The colour name was not associated in the child's mind with any quality of yellowness.

Again, a child may be made familiar with colour names as applied to a particular picture, so that he can point out correctly the yellow flower, the red flower, the blue flower, etc.; and yet, if asked which is the red flower in a nosegay, he may point to a wrong one, not because he is colour-blind, but because he has not picked up the proper application of the colour name. To him 'red flower' is simply the name of the big one in the centre of the picture, and 'blue flower' the name of the little one below. It is only by the repeated application of the same term to all sorts of objects that the child comes to recognize the exact meaning implied.

Another important quality of objects is *form*, and, although it may not be inherently so attractive as colour, it is certain that interest in form develops at a very early age. Miss Shinn, who studied this matter very carefully, tells us that her niece was taught the letter O in the beginning of her twelfth month. On her 343rd day she pointed it out in a book, and always knew it afterwards. On the same day she found a large Q on a card she was playing with, and held it up with a questioning sound, evidently recognizing its resemblance to the form she knew, and yet regarding it with doubt, conscious of the difference. In her twentieth month she had given to her a box of variously coloured tablets of different forms—circles, squares, oblongs, etc. For a few days she played with these by sorting out the different colours, but within a week she began to select by form—a method of occupation with them that lasted, with little decline of interest, till the twenty-fourth month. By the twenty-second month this child was familiar with the names of the forms of her tablets, and soon began to take pleasure in applying her knowledge to figures about her. Thus, she called her aunt's attention to the triangles on the corners of a writing-table. Again, one day she drew a hairpin from her mother's hair, and pulled the points apart some 45 degrees; then, struck by its appearance, held it up and cried, 'Triangle!'

The use of names of things, and to a much lesser degree of qualities, precedes considerably the use of verbs. This is, however, compensated for in part by the free use of gesture, by which action is easily signified, and in part by the use of sentence-words. Thus, the word 'pussy' with one gesture may mean 'There is the pussy'; with another, 'I want the pussy'; with another, 'Pussy scratched me.' 'Up' may mean 'Lift me up'; 'Knee,' 'Take me on your knee.' When verbs begin to be used, the imperative mood always makes an early appearance, and such useful verbs as 'don't' are very early mastered.

The personal and possessive pronouns are a source of great confusion to the child, who does not usually learn to use them correctly until well on in the third year. The difficulty obviously arises from the fact that the pronoun often has to be changed with the speaker. Thus, the ownership of a hat may be correctly expressed in the words, 'That hat is yours'; but if the owner of the hat desires to say the same thing, he must use different words—namely, 'That hat is mine.' So the child, hearing himself constantly addressed as 'you,' has naturally some difficulty in understanding why he may not apply the same term to himself, or why, when people so often say to him, 'Come and sit on my knee,' he may not make the request, 'Let me sit on my knee.'

VOCABULARIES.

Many of those who have made observations upon the development of speech have published children's vocabularies. Professor Tracy[1] of Toronto has taken the trouble to collect a number of these, and has found some interesting facts bearing on language growth.

'For example, with regard to the relative frequency of

[1] *Psychology of Childhood*, fifth edition; Heath, Boston, U.S.A., 1901.

the various parts of speech, the following table is instructive. Of the 5,400 words comprising the vocabularies—

60	per cent. are	nouns.
20	„	verbs.
9	„	adjectives.
5	„	adverbs.
2	„	pronouns.
2	„	prepositions.
1·7	„	interjections.
0·3	„	conjunctions.
100·0		

Of the nouns, less than 1 per cent. are abstract. Nearly all are names of persons or familiar objects. The majority, in the earlier months, seem to be used almost in the form of proper nouns. The adjectives are mostly those of size, temperature, cleanliness and its opposite, and similar familiar notions.'

Professor Tracy draws attention to one very interesting feature of this table, and that is the relatively large proportion of *verbs*. We are generally told that the child's knowledge of nouns progresses much more rapidly than is the case with other parts of speech; but, as Tracy rightly says, this is not proved by the fact that the child is familiar with a greater number of nouns than of other parts of speech, but it must be shown that his nouns bear a larger proportion to the number of nouns he will use as an adult than the number of his verbs bears to the number of verbs he will use in adult life. Now, Kirkpatrick says that of the words in the English language, 60 per cent. are nouns and 11 per cent. are verbs; and from this Tracy argues that the child of two has made nearly twice as much progress in learning to use verbs as in learning to use nouns.

This statement, however, is obviously open to the criticism that Kirkpatrick's table, being based upon the dictionary, probably does not represent the proportion of the various parts of speech in average adult language. To test this point, Kirkpatrick has estimated the proportion of nouns to verbs in *Robinson Crusoe*, and it seems the proportion is not 60 to 11, but 45 to 24—that is to say, the proportion of verbs is relatively much greater than in the dictionary, and considerably greater than in the vocabularies of children. Professor Tracy admits that if *Robinson Crusoe* represents the average adult vocabulary, his conclusion regarding the acquisition of verbs will require revision. He suggests, however, that in a book so full of *action* as *Robinson Crusoe* the verb element may be unusually strong. I have, therefore, estimated the proportion of nouns to verbs in a descriptive work—part of Tyndall's *Glaciers of the Alps*—and find it practically the same as in *Robinson Crusoe.*

However, it is probably not altogether fair to compare a vocabulary with a book, and in a child's vocabulary classification must be difficult, for many words which a grammarian would classify as nouns may be used quite frequently as verbs. Whatever be the proportion of verbs which the child may know, the verb element, expressed or implied, is certainly not lacking in the child's speech; and Tracy is doubtless right in his conclusion that the study of the course of the acquisition of speech confirms the Froebelian principle that education proceeds 'most naturally (and, therefore, most easily and rapidly) along the lines of motor activity.'

It would seem, then, from this very brief summary of the development of speech, that here, as in the case of other powers and faculties, the two great factors heredity and environment have their respective parts to play.

To heredity the child owes not only the speech mechanism, but the tendency to use it. This use takes the form at an early period of the utterance of sounds and cries which, in association with gesture, express the baby's emotional state. In a short time sounds are uttered, not only when the infant is emotionally aroused, but as a species of play, the child evidently delighting in making and repeating vocal sounds of various kinds, but of no obvious significance, although this use of the vocal organs is doubtless of importance in giving the organs exercise and in bringing them by degrees under the control of the will. Heredity, in the next place, urges the child to imitate the various sounds it hears—natural sounds—the cries of animals and the voices of other people.

The earlier sounds produced by the infant—crying, laughing, crowing, babbling, and so on—occur independently of the environment, except so far as the latter calls forth particular emotional states; but with the appearance of the imitative instinct the importance of the environment rapidly increases as it furnishes the infant with more and more sounds to be copied. The speech of the infant is now largely of an interjectional character, and onomatopoetic words constitute a large proportion—30 to 40 per cent.—of the entire vocabulary, as was doubtless also the case in the speech of our ancestors in early prehistoric times.

The sounds predominating in the child's mother-tongue now come to be increasingly practised, the vowel sounds at first being much more numerous than the consonants, but the consonants becoming more and more numerous as the child learns to imitate successfully the words he hears.

The actual acquisition of words appears to be marked by periods of acceleration and decline, and this fact is interesting because it brings speech into line with what we know of growth generally. Growth in height and weight, for example, show this feature very obviously.

The development of speech furnishes a good example of the value of the educational dictum, 'No impression without expression.' It is very important that children who are learning to speak should hear a great deal of conversation between well-informed adults who speak with a good accent and discuss simple, everyday topics. It is equally important that they themselves should have ample practice in expressing their own ideas, in asking and answering questions, and in describing things they have done or places and things they have seen. Errors in pronunciation and grammar should be corrected, and pains should be taken to ascertain that children understand the meaning of what they say. Children often treasure up phrases or observations they have overheard, and bring them forth again on what seems a suitable occasion, and they very easily get into a habit of learning and repeating pieces of poetry without inquiring as to the meaning of words and phrases which they do not understand.

There can be no doubt that the educational backwardness of the more ignorant classes is greatly aggravated by the absence in childhood of those informal conversation lessons which the children of educated households enjoy. One of the main ends of the infant-school should be to supply this want.

Defects of Speech.

Some defects of speech may receive brief notice.

Lalling is a term applied to the imperfect baby speech which results from a want of precision in the use of the oral articulative mechanism (lips and tongue). It normally passes away as the child gains control of the movements of articulation. Occasionally, however, it persists. In such cases, as a rule, the majority of consonants can be pronounced correctly, but one or more continue to be mis-pronounced. Thus, *w* or *l* may be substituted for *r*, *t* or *d* for *g* or *k*, or, in lisping, *th* for *s*. When lalling is persistent it may be due to imperfect education, sufficient care not having been taken to teach the child to pronounce properly; to slight deafness, preventing the child from picking up the correct sounds; or to imperfect intelligence. Lalling speech is very common in imbeciles.

Echolalia is also common in young children, and disappears as the child gains voluntary control over the mechanism of speech. The child tends to repeat like an echo any sentence, or the last word of a sentence, addressed to him.

Bradylalia is a condition where speech is abnormally slow, and is to be contrasted with *logorrhœa*, in which words are poured forth 'like peas from a spout.' Both conditions are more common in persons of imperfect intelligence.

Stammering is not very uncommon in young children who are learning to talk. Such cases usually get better without special treatment. Most cases of stammering, however, begin about the age of seven or eight. The condition is mainly due to a want of promptitude in the action of the voice-producing part of the articulative apparatus—that is to say, in the vocal cords. There is rarely any difficulty in producing the vowel sounds. The consonants which cause greatest difficulty are the voiceless explosives *t*, *p*, and *k*, and the voiced explosives *b*, *d*, and *g* are only a degree less difficult. Few stammerers have any difficulty in singing. Many can avoid stammering by intoning. Stammering is always worse under excitement.

The treatment should include—

1. Attention to the general health.

2. Respiration exercises designed to promote control of the air-blast which sets the vocal cords in vibration.

3. The study of Wyllie's[1] physiological alphabet, so that the sufferer may understand the nature of his defect.

4. Systematic drill in the production of various sounds.

5. Daily reading aloud.

6. Special attention to and drill in sounds which have caused difficulty during the day.

7. Abstention, at the beginning of treatment, from all conversation whatever for a period of two weeks.

It is obvious that this treatment cannot be carried out in its entirety in the case of young children. Some 'stammer doctors' will not take pupils under ten.

B. DRAWING.

The fascinating subject of children's drawings may appropriately be included in this chapter in order to emphasize the fact upon which all observers are agreed—that young children draw, not with the object of producing a work of art, but for the purpose of expressing their ideas. Drawing is, in fact, a form of 'picture-writing.' Children draw 'out of their heads.' Even if an object is placed before them as a model, they do not copy what they see, but draw what they know to be there. Several observers have tried the experiment of posing as a model for school-children to draw, and all have found that the younger children nearly always drew a full-face view, even when they saw the model in profile. In the same way young children will represent three sides of a house as visible at the same time; both eyes in a profile figure; or both legs of a man riding on horseback.

In their choice of subjects children are not influenced

[1] John Wyllie, M.D., *The Disorders of Speech*. Oliver and Boyd, 1894.

in the least by the consideration of what is easy to draw. More than 90 per cent. of their drawings are of the human form divine, and, interested as we have seen them to be in action, it is not surprising to find that the people they draw are usually doing something. Thus, the men smoke enormous pipes; the ladies carry parasols; the very houses are not idle, but are represented with all their chimneys pouring out volumes of smoke. A little boy who drew for me a railway-train without wheels explained that the wheels could not be seen because the train was going so fast. Objects in motion are favourite subjects. Sometimes the movement is represented by lines. Children will even draw invisible things, such as the wind.

Children frequently draw by fits and starts. When the fit is on they may draw for hours at a time, and the things they draw are a valuable indication of the contents of their minds, and a collection of the drawings made by a single child during a period will often show that his mind has been occupied with an extraordinary variety of subjects. Of such a collection made by a boy between five and six years of age Dr. Lukens says the drawings 'show an amazing variety; greater, I should say, by far, than that covered by the usual curriculum in any one grade.'

The extraordinary complaisance with which children regard their attempts at representation seems rather puzzling. A child will draw a man with a square head, or with his arms growing from his head; or he will make the head much bigger than the body, or represent the body and limbs as visible through the clothes. Are we to regard the child's satisfaction with such productions as an indication of the imperfection of his perceptions? Are we to suppose that he has not observed where the arms spring from? Is the absence of a neck in the early drawings due to the fact that when he regards himself in the glass his neck is not visible and his head appears set directly upon the trunk? Such explanations have been seriously offered, but probably the difficulty itself is mainly the result of the inability of the adult mind to understand the fact that the child's drawings are symbolic rather than representative. The child regards his symbolic man with exactly the same sort of satisfaction as many adults do the altogether unintelligible scribble which they use as a signature. A child who can pick out correctly the best drawings of a series of various degrees of verisimilitude may continue to represent human beings in the style which he has adopted—without necks, with diaphanous clothing, and so on. In producing his own drawings his imagination fills in what is lacking, while his perceptive and critical faculties are in abeyance. Occasionally a child, who has produced some more or less elaborate drawing with which he is greatly pleased, will return to it again after an interval, and looking at it with his critical faculties now awake, will declare tearfully and indignantly that some one has spoiled his picture in his absence.

Another point to be noted is the extraordinary rapidity with which children draw. While an artist will spend days upon a single figure, a child will scarcely spend seconds. He wishes to set his ideas on paper as fast as possible. Such haste is, of course, fatal to anatomical exactness, hence the insertion of the salient features anyhow. If the mouth is represented on the trunk instead of occupying the ordinary position, this may be because the nose, having been drawn in a hurry, already occupies too much of the face to leave room for the mouth. In a similar way the teeth are apt to overflow from the mouth.

After the age of ten, and more markedly after the age of twelve, the child becomes much more critical of his drawings and much more sensitive to the criticism of others. The difficulties of technique are more clearly realized, and perspective becomes a problem. Accordingly, children become much less ready to express themselves in drawing, and with disinclination and self-consciousness there comes disability, so that drawings made at this time are often much less vigorous and striking than those made earlier.

It has been suggested that the development of drawing should show the same stages as the development of speech, somewhat as in the following table, which I take from an article by Dr. Lukens:[1]

SPEECH.	DRAWING.
I. Automatic cries and reflex or impulsive sounds.	I. Automatic and aimless scribble.
II. Imitation of sound, but without meaning; child babbles back when addressed.	II. Scribbling localizations and imitation of movements of other persons' hands.
III. Understands words, but does not yet speak beyond such words as 'mamma,' 'papa,' etc.	III. Understands pictures, but does not yet draw beyond the simplest localization of features by scribbling.
IV. Repeats words as mere sounds. (Brief stage, and of little importance.)	IV. Copies from others to see how to get the right effect in the use of lines.
V. Uses words to express his thoughts.	V. Picture-writing, illustrated stories, scenes, etc.
VI. Studies grammar and rhetoric.	VI. Studies technique of drawing, perspective, proportion, shading, etc.

The study of children's drawings suggests many questions. In the first place, the question arises whether we are right in our methods of teaching drawing. Ought we to drill young children in drawing straight lines and

1 *Ped. Sem.*, vol. iv., 1896-97, p. 79. *Cf.*, also, article on the 'Learning of Language,' *Ped. Sem.*, vol. iii., p. 427.

geometrical figures, or should we let them begin with the human form, animals, and other interesting things, and bring them on by criticizing their spontaneous drawings, and by showing them how to improve their work?

In the next place, one may ask, Why is not more use made of drawing for the training of the mind? It is obvious that drawing is one of the most delightful of a child's spontaneous activities, requiring but little encouragement beyond the provision of material. Hence drawing should be of the greatest value in connexion with nature lessons, stories, reading, history, and geography.

CHAPTER XVI

SOME MORAL CHARACTERISTICS

'That is not first which is spiritual, but that which is natural.'—1 COR. xv.

THE moral characteristics of infancy and childhood have been depicted in strikingly different fashions by those who have allowed themselves to be influenced by *a priori* considerations. Thus, believers in the doctrine of original sin, whereby, to quote the 'Westminster Confession,' 'we are utterly indisposed, disabled, and made opposite to all good, and wholly inclined to all evil,' have depicted the character of little children in the blackest colours, and have found in their greediness, selfishness, and naughtiness abundant confirmation of their views. Others, again, revolting against this horrible doctrine as a slander upon human nature, have gone to the opposite extreme in maintaining that all children are born good, that their souls as they leave the hands of the Creator are as pure as driven snow.

The general abandonment of belief in the special creation of the human species has naturally thrown discredit upon the doctrine of a fall from a state of pristine innocence, and most students of children seem now to be agreed that the child is neither wholly good nor wholly bad, and that the moral value of the various propensities which appear in childhood cannot be justly gauged by adult standards of moral worth.

The child is, in short, to begin with, neither moral nor immoral, but unmoral, and childish propensities which have a moral aspect may be very fittingly designated in Professor Sully's phrase 'the raw material of morality.'. Many of these propensities are best understood in the light of the evolution theory. As is the case in the lower animals, the impulses of children are centred in self, and their strongest passions express their desire for the gratification of appetite, or their resentment at anything which interferes with such gratification.

To call such impulses wicked is to forget that they are purely instinctive reactions under no control of the will. The impulses become more definitely moral with the development of the sense of self and of a consciousness of the existence of others. The impulses may now be classified as promoral and contramoral. Fits of anger are counterbalanced by displays of tenderness and affection. Generosity alternates with greed. Often the very exercise of one impulse seems to call up its opposite, as when a child gives away one of his toys, and immediately, seeing it in the hands of another, peremptorily asks it back again.

As life struggles forward these impulses tend to become more and more numerous, so that they frequently conflict with one another, while at the same time the complex opportunities of human environment offer competing attractions which arrest, in a momentary hesitancy, the impetuousness of instinct, and call for deliberation and choice.

This moment of hesitancy is a pregnant one for the educator, because it gives him the opportunity of throwing the weight of his experience and influence in favour of this choice or that, and the choice once made will influence future conduct indefinitely. Children are creatures of habit in nothing more than this—that a particular line of conduct which they once adopt, for any reason whatever, becomes a source of childish preferences, the germ of a bias towards certain lines of action, the possible foundation of a scheme of moral values.

The moralization of these early impulses obviously appears to depend in part upon a congenital aptitude, without which the child could not be morally trained at all, and in part also, as I have already endeavoured to show, on the care and forethought which have been bestowed upon the early development of habit. Order, regularity, punctuality, should be in the atmosphere the child breathes from birth, and where this is the case the recognition of law must be rendered much more easy.

The first conscious recognition of law, perhaps, comes through conflict with the wishes of others, and the rebellious opposition of the young child to all restraint often conceals what is, I believe, the fact that conformity to law is just as natural, just as much a part of the child's 'nature,' as is the law-resisting temper. The child's disobedience is often simply a protest against a particular interference with his activity, while his fundamental law-abidingness may be shown in an almost slavish adherence to custom, or what we in Scotland call use and wont. Thus, from a very early period the child insists on having his own place at table, on having his bread-and-butter cut in a particular way, on strict conformity to a definite ritual in dressing and in going to bed.

The commands and wishes of those about him, interfering as they do with his active impulses, his absorption in play, his fondness for mud-pies, cannot but appear to him in many instances quite arbitrary and senseless; and it would be difficult ever to bring him into conformity with the social customs which hedge him about were it not for his openness to suggestion and his impulse to imitate, not merely the actions, but the sentiments, of those about him.

At an early period the child identifies 'right' with what is permitted, and 'wrong' with what is forbidden; but is there not a dim sense of law in his tendency to extend the rules which are laid upon himself to those about him? Children playing with their dolls or with one another at such games as 'school' are always very strict disciplinarians, nor do they hesitate to extend a recognized rule to older persons. As Sully remarks, 'A collection of rebukes and expositions of moral precept supplied by children to their erring parents would be amusing and suggestive.'

A fuller recognition of the moral law seems involved in the adoption of an ideal of conduct which the child voluntarily strives to follow. Such ideals begin to be formed very early. Children little over two may criticize their own conduct, confessing some naughtiness or vaunting their virtue. Thus, a little chap, having given away a part of his cake, marched up and down the room exclaiming, in admiration of his generosity, 'Dood tind baba!'

At about the age of six there is often a pretty decided change in the personality. The little child becomes more distinctly a boy or girl. Changes in manner, in expression, in modes of thought, appear. Something of the charm and simplicity of infancy passes away. The child becomes more independent, more self-assertive, perhaps rougher in manner and less gentle of speech. No doubt school is the main factor in calling forth these changes, but growth tendencies are at work also. If early childhood is characteristically receptive, imitative, open to suggestion, later childhood and youth are characteristically active, energetic, executive. At school the child finds himself not merely one of a large family, but a member of a society in which he must learn to take his place as a positive force. He must become conscious of his own powers. The instincts of childhood find a wider range, and new impulses, called forth in response to the new environment, seek channels for their exercise and development.

The imitative instinct of the little child was satisfied with the mere repetition of outward acts, and such literal imitation has played a large part in the formation of bodily habits. But it has also done something more. Imitation of an action has led to the experience of how it feels so to act, and this experience, continually growing in volume as the years go on, awakens fresh interest in the examples followed. So the child strives more and more, not only to copy outward actions, but to reproduce the spirit of the actions. In his make-believe plays he strives to live again the life of his heroes—of the soldier, the sailor, the explorer, the hunter, the Indian chief. Legend, fiction, history, supply him with models, with examples, with heroes, and when the literal imitation of these has been put away as a childish thing, the spirit of their lives remains with him, and he strives among his fellows to act with courage, to endure hardness, to be true continually to the ideals they have helped to build.

With this wider outlook, this more sympathetic insight, there come also, in concourse with his companions, the characteristic boyish impulses—the delight in energetic action, the spirit of emulation, the innate combativeness, all those primitive instincts derived from generations of hunting, fighting ancestors which find satisfaction in the excitement of the favourite boyish games.

In these, no less than in the simpler impulses of childhood, lies the opportunity of the educator. Each of these as it arises indicates the presence of power, which with right guidance and fitting opportunity will lead to the formation of useful habits and the foundation of wholesome interests; but if the opportunity is lacking, the instinct fails from want of exercise, or finds outlets in wrong directions, and no subsequent effort can altogether make up for the opportunity lost.

Many of the evil characteristics of this period are undoubtedly due to the cropping up of barbaric impulses which have not yet been evolved out of human nature. Young children are often cruel to animals because they do not know they hurt them, but the same charitable view cannot be taken of the teasing, and bullying, and cat-hunting of schoolboys. No doubt teasing is frequently a manifestation of the play impulse, and cruelty often results from thoughtlessness; but I fear boys at a certain stage are naturally more or less cruel and heartless. If such cruelty can be explained as the appearance of 'fragmentary rudiments of past combat, capture, and killing of prey and enemies,'[1] one may admit the plea that the boy's conduct should not be judged by the highest standards of civilized life. But there is all the more need for the educator to realize the probability of such atavistic tendencies cropping up in force, and to lay his plans for modifying them by careful teaching.

The school period obviously furnishes the opportunity for statistical investigations, and already a number of studies have been made. Among these the study of children's ideals has been a favourite topic. The test which has been most used for this purpose consists in asking the children to write compositions in answer to the question, 'What person of whom you have heard or read would you most like to resemble? Why?' The results[2]

[1] Burk, 'Teasing and Bullying,' *Ped. Sem.*, vol. iv., 1897.

[2] Miss Darrah, *Pop. Sc. Monthly*, vol. liii., p. 92, May, 1898 (American children); Earl Barnes, *Ped. Sem.*, vol. vii., p. 3, April, 1900 (London

of this test support the observation that children's personal ideals are at first moulded upon the people they know, and then gradually extend to contemporary characters, and to historical and imaginary personages. Considering the admittedly important part played by fiction in moulding a child's ideals of life and conduct, it is rather curious to find that story-book characters form a very small percentage of those actually named by the children. Of the children whose papers were studied by Earl Barnes, only 2 per cent. of the boys and 5 per cent. of the girls turn to the world of imagination for the selection of an ideal. Of the Edinburgh children, only 1·7 per cent. of the boys and the same percentage of the girls choose their hero from fiction. Does this mean that children tend, as Earl Barnes suggests, to keep the world of romance separate from the world of the real? Or does it mean that in a school exercise children naturally choose characters from their lesson-books rather than those who belong to that other world beyond the walls of school? So far as the Scotch children are concerned, the lesson-books seem to supply an abundant choice of heroes, for in the 2,500 papers examined no less than 160 celebrated persons were mentioned.

'Children's Lies' have been the subject of several interesting studies. Thus Professor Sully[1] has discussed the varieties and the causes of untruthfulness in young children; Dr. Stanley Hall[2] had 300 school-children interviewed as to their ideals and practice with regard

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children); A. Young, *Practical Teacher*, 1900 (Edinburgh children); Miss Dodd, *National Review*, vol. xxiv., p. 875, 1900 (English children); Earl Barnes, *Studies in Education*, vol. ii., 1902 (American children).

[1] *Studies of Childhood.*

[2] *Amer. Journ. of Psychol.*, vol. iii., 1890.

to truth-speaking; and Miss Louch[1] more recently published the outcome of a *questionnaire* addressed to adults, who were invited to recall their childish fibs or instances of being unjustly accused of falsehood. The subject is so important that it deserves some consideration here, and in my remarks I shall not restrict myself to school-children.

Many people regard children as naturally untruthful, and even scoff at the idea that a child can be really truthful until training and discipline have made him so. Now, it cannot be denied that fibbing is one of the commonest of children's faults, but I think we can find in child nature some propensities which make strongly for truth-telling, as well as others which make the descent to falsehood a very easy one. The relative strength of these opposing propensities varies, but I have no doubt that there are many cases in which the former are so strong that the children will be habitually, perhaps even pedantically, truthful if they only have a fair chance. If some one would publish a study of the untruths which adults tell to children, I think it would help us to be more charitable in our estimate of children's veracity. Apart from the deliberate untruths which are often told for the purpose of checking the child's inconvenient curiosity, think of the careless and inaccurate replies which are thought good enough responses to his desire for knowledge. Think, also, of the banter in which many adults indulge, finding pleasure in the ready credulity with which children swallow all sorts of marvellous fabrications. Careless guardians, again, often emphasize their orders with all sorts of promises and threats which they never intend, and which the child quickly discovers they never intend, to fulfil. In these and other ways grown-up people who,

[1] *Paidologist*, vol. iii., 1901.

perhaps, regard themselves as perfectly truthful, not infrequently, I fear, are responsible for undermining children's respect for truth.

But if a child has a fair chance, that is, if he is brought up among habitually truth-speaking people, there are many influences which will favour the natural respect for truth. Of these influences the force of example is the most potent. Next to this I should place the simple fact of learning to speak, which necessitates incessant practice in associating words with things, and statements with facts. To a child, a name is much more than a mere arbitrary symbol for a thing. Bread *is* bread, and no child can understand how on earth the French can remember to call bread *pain*, or a horse *cheval*. 'Surely,' said a little girl, 'if they are in a hurry, they sometimes forget, and call things by their real names.'

Truth-speaking, then, may become a simple matter-of-course, and I agree with Sully[1] that to a habitually veracious child a lie may appear something awful. If such a child should ever, in circumstances howsoever exceptional, actually tell an untruth, he will feel 'a shock, a horror, a giddy and aching sense of having violated law —law not wholly imposed by the mother's command, but rooted in the very habits of social life.'

Of the factors which may plant the seeds of untruthfulness, one of the most important is the sensitiveness which is a normal childish propensity. All children love to be entrusted with secrets, and most love to invent little secrets of their own. I suppose it gives a child a delicious sense of superiority to know something which grown-up people do not know. Sometimes the tendency to manufacture secrets becomes almost a mania, so that a child may be unable to answer a question without a

[1] *Studies*, p. 265.

preliminary laugh, and a pursing of the lips, or an aggravating, 'Ah ha, *I* know.' Matters become more serious when a child takes to doing things on the sly. For example, a child may wait till he is unobserved before helping himself to a biscuit, which he knows he might have had for the asking, or sneak quietly out of the house in case he may be asked where he is going, although he has no intention of going anywhere forbidden. Such slyness, however, though a disagreeable and dangerous trait, scarcely amounts to dissimulation. More definitely untruthful are the little acted lies by which quite young children often try to deceive, as when a little mite who had been refused more bread-and-butter until her crust had been eaten, seized a suitable opportunity to throw the disliked crust under the table. Another child, having spilt some cocoa, as she thought unobserved, quietly slipped the bread plate over the offensive stain.

Children's make-believe play, again, involves much imaginative talk, which has no accord with reality. Such playful use of words may be comparatively free from danger, but it does sometimes require a little argument to persuade John that he must own up to the mischief which he did when he was not John, but Jack-the-Giant-Killer, or the Ogre. The child's love of exaggeration also, and of creating an impression, will often lead to statements which, if not deliberately false, are perilously near it. Indeed, no less a man than Darwin[1] tells us in his 'Autobiography,' that in his boyhood he was much given to inventing deliberate falsehoods for the sake of causing excitement. For example, he told a companion that he could produce variously coloured polyanthuses and primroses by watering them with certain coloured

[1] *Life of Charles Darwin*, p. 6; Murray, 1892.

fluids, 'which was, of course, a monstrous fable, and had never been tried by me.'

The vividness of children's imaginative processes frequently leads to the presentation of the creatures of fancy in the garb of fact. A lady visiting a Board-school lately, was told by a teacher that one of her pupils had been turned out of the house by his mother the evening before, and had been out all night. The teacher was very indignant, and said the parents should be punished. The child, on being questioned, declared tearfully that his mother put him out of the house because there was no room, and that he had slept all night in a stable. The lady, after some conversation, soon came to the conclusion that the events detailed were quite imaginary, and she began talking to the child about other things. Upon asking him if he had learned any new hymns recently, he said he knew 'Once in Royal David's city,' and the source of his imaginings was at once revealed. In such cases as this it is obvious that the treatment needed is some careful exercise of the perceptive faculties rather than an appeal to conscience.

Among the school-children studied by Stanley Hall high ideals of truthfulness were prevalent. As a rule the children displayed a healthy tendency to look at moral situations as wholes. While a few regarded every deviation from literal truthfulness as alike heinous, the majority were found to admire 'burly boys who by false confessions take upon themselves the penalties for the sins of weaker playmates.' Many of the children thought it would not be wrong to tell a lie if a parent wished them to do so. 'Truth for one's friends, and lies for one's enemies, is a practical, though not distinctly conscious rule widely current with children.' This, perhaps, exemplifies the fact that school-children tend to take their moral ideas from their fellows rather than from their parents or teacher. In taking or giving prompts, peeping into their books, and copying from one another, children feel that they are acting in concert against the teacher, whose business it is to catch them if he can. Such dishonesty seems to the offenders much more justifiable if the teacher is disliked. An excessive use of punishment, combined with lax supervision, is frequently responsible for dishonesty of this kind. Indeed, a great many lies, both at home and at school, come on the scene in connexion with discipline. A timid child, suddenly confronted by authority harshly demanding an explanation, is put upon his defensive, and feels challenged to use his wits to get out of the scrape.

Another form of cheating, less deliberate, perhaps, in character, may arise in connexion with games. We are so accustomed at the present day to hear play lauded as the source of all the virtues, that we are apt to forget that most games have their own temptations to cheating. Of the lies which may be prompted by the excitement of games, Stanley Hall says 'they are so soon forgotten when the excitement is over that they rarely rankle, and are hard to get at, but they make boys unscrupulous and grasping.'

A study of children's lies, then, seems to bear out our general contention that the moral side of a child's nature is unformed, and not to be judged by adult standards. Amongst the various innate propensities are some which are favourable and some which are unfavourable to morality. It is for education so to train and co-ordinate the various faculties that not only may good habits be formed, but the higher motives may become the regulative principles of conduct.

It is unfortunate that the various studies which have been made upon school-children stop at about the age of twelve or thirteen; stop, that is to stay, at the dawn of the adolescent period. The consequence is that they furnish us with but little indication of those rapid developments which are soon to work so great a change in the child's whole nature. Up till the time of puberty the child is characteristically self-centred; but he now undergoes a new birth into a world of wider relationships, and the further development of his individuality will be not alone in his own interests, but in the interests of his race.

Adolescence is the normal culmination of the preceding periods, and is universally recognized as a period of storm and stress; of special difficulties in training; of special temptations; of doubts and fears; of longing and yearning; a time of

> 'Low whispers, vague and strange,
> Which through our being range,
> Breathing perpetual presage of some mighty coming change.'[1]

Development at this period proceeds with remarkable rapidity, and many important interests come to the front. Thus the æsthetic, the scientific, the social, the religious interests normally receive a decided impetus—often, indeed, a sudden awakening. These various interests naturally affect one another, and the development of the reasoning powers, the quickening of sympathy, the cultivation of taste, have the most intimate bearing upon moral progress, and it is not too much to say that when the intellectual faculties are torpid the moral state cannot be a very lofty one.

This rapid development throws a considerable strain upon the nervous system, and involves a considerable amount of friction. This may be shown by the appear-

[1] Lewis Morris.

ance of distinctly morbid phenomena, such as extreme irritability of temper, depression of spirits, aversion to relatives, perversions of the moral sense, and all sorts of impulsiveness and eccentricity. Statistics show that between the ages of twelve and fourteen there is a marked increase in crime, and this increase continues for a number of years. Marro tabulated the conduct of 3,012 boys from eleven to eighteen years of age. According to the teachers' estimates, the proportion of boys who were marked 'bad' increased from 30 per cent. at eleven to 42 per cent. at fifteen, and then fell steadily to 26 per cent. at eighteen.

If these figures indicate a tendency for adolescents to pass through a stage of preternatural 'badness,' others indicate that a hypersensitiveness of conscience is also extremely common. The morbid conscience of adolescence frequently magnifies all sorts of trivial faults into crimes, and constantly plagues its possessor by telling him that he should have acted otherwise than he has done. This worrying over trifles is merely an exaggeration of the normal heightening of the ethical impulse. Up till this period good conduct has consisted largely in obedience to rules, backed, of course, by habit. It now comes to be the outcome of an inward sense of duty more vividly realized than ever before. This increased feeling for the claims of righteousness may be associated with doubt and uncertainty as to religion. Religious teachers are fond of asserting that scepticism and moral laxity go together. It is so in some cases, but certainly not always. It is even not uncommon—as is shown, for example, in Starbuck's returns[1]—for young people who are passing through a phase of agnosticism or unbelief to pride themselves on being more moral than those who profess religion.

[1] *The Psychology of Religion*; Walter Scott, 1899.

The exaggerated 'goodness,' and much also of the 'badness,' prevalent at this time must be regarded as the expression of the normal self-assertiveness of the early adolescent period. Associated with this characteristic is a tremendous admiration for strength and physical courage. Hero-worship now reaches its acme, and many of the scrapes into which boys fall result from an endeavour to emulate, amidst an unsympathetic civilization, the exploits of Dick Turpin, Jack Shepherd, or other heroes of the same type.

Another characteristic of the period is the assertion of the social impulse, which leads young adolescents to band themselves together into more or less secret societies, commonly called 'gangs.' These gangs have attracted a good deal of attention, because their doings frequently bring them into collision with the established forces of order, as in the case of the 'hooligans' of London, the 'larrikins' of New York, the Mohawk clubs, and Hell Fire clubs of former days. Are these simply practical demonstrations of the depravity of human nature, over which we must wring our hands in despair, or which we must suppress, or at any rate drive out of sight, by resort to brutal methods of punishment? On the contrary, we have here simply groups of young fellows in whom the deep-rooted turbulent instincts of adolescence are coming to the front, and finding scope in undesirable ways; and this, partly because no channels of action at once attractive and unobjectionable are provided for their exercise, and partly also because the earlier impulses of childhood have not been turned and directed aright. In children brought up under happier circumstances the early instincts find natural and healthy outlets; good habits are formed, and the gang instincts when they appear are met by such invaluable games as football and cricket. These games demand, not merely the expenditure of energy, but such qualities as co-operation, obedience to a leader, the subjugation of self for the sake of one's side, and thus, in giving vent to the adolescent impulses, they afford exercise for many qualities of great value for modern social life.

During the self-assertive stage both boys and girls are often extremely unconventional in manners and opinions. Like Gwendolen Harleth in *Daniel Deronda*, they 'like to differ from everybody, and think it stupid to agree.' This phase may be followed by a period of almost slavish adherence to custom and convention. Sentiment now becomes more marked, and the emotions are easily stirred by poetry and music. The attraction of the opposite sex becomes strongly felt, and religion is realized as an experience of the heart and conscience.

These emotional states have obviously a very direct bearing on the moral life. For the educator the important point is to see to it that the inner activity is directed into suitable channels of conduct. For an excess of sentiment, left to itself, by no means always results in more careful attention to duty. It may find vent in a perfervid religiosity, or in criticism of others, while the 'weightier matters of the law' are left neglected. Much of the unrest and misery of adolescence is due to the cultivation of an excess of emotion which finds no satisfactory outlet. The tragic results which may attend an extreme case of this kind are vividly portrayed in that wonderful study of adolescent psychology, the play of *Hamlet*.

The management and control of the sexual instinct becomes, in the case of many persons, the most urgent problem of this period, and there has been a good deal of discussion recently as to the extent to which information regarding birth and sex should be given to children. The discussion of this subject pertains to child-culture rather than to child-study. But from our present point of view it may be said that whatever may be decided as to the amount of instruction, and the time at which it is to be given, the doctrine that each stage of a child's life is influenced by preceding stages has an important bearing upon the subject. From this point of view, for example, we can understand the great importance of the lessons in modesty given to young children. Young children are neither modest nor the opposite, and their first lessons in modesty have no meaning for them, but are mere conventions, which they accept as they do other conventions which are laid upon them. But the practice prepares the way for the feeling of modesty, and this again assists the development of a state of mind which will welcome instruction concerning birth and sex from a proper source, and resent the suggestions of vicious, morbid, or idle talk.

The unity of the child's life, again, should put us on our guard against the danger of producing an artificial isolation of the purely animal instincts. This danger is, undoubtedly, increased by depriving young people, during the school period, of the natural social intercourse of family life. The value of whatever instruction is given depends in only a minor degree upon the amount of specific instruction, but to a very high degree upon the general tone attending the presentation of the subject, and this can in no manner be so guarded as by association with all that makes home sacred.

CHAPTER XVII

RELIGION AND THE CHILD

'Science was Faith once; Faith were Science now,
Would she but throw her bows and arrows by,
And arm her with the weapons of the time.'

LOWELL.

MANY people who admit the value of investigations of children's physical and mental development will have grave doubts as to the propriety of extending the methods of child-study to the religious life. I have already admitted the danger which must attend any attempt to pry into the inner citadel of the soul. But I believe that careful child-study is capable of giving us very real help in the problems of religious education, while on the other hand ignorance of child-nature may be quite as dangerous as the curiosity which sometimes masquerades as scientific research.

Some little time ago I was at an English watering-place where might be seen every afternoon a small army of children deeply engrossed in the delights which a fine stretch of sand affords. Now, there was arranged a series of 'Services for Children,' and one day, just when the fun was at its height, a band of young ladies raided the beach and *ordered* the children 'to come along because the service was just going to begin.' In a remarkably short space of time the children, moved partly by the habit of obedience, partly by the force of example, partly by curiosity, came streaming up to the selected part of the promenade, where, after some hymn-singing, they were harangued by a young adolescent, whose address must have been quite unintelligible, as it was evidently entirely uninteresting to the youngsters assembled. Now, can one imagine any plan more calculated to make religion distasteful to children than thus, in its name, to drag them away from their happy play and crowd them into a hot, perspiring mass of inattentive, cross, and fidgety humanity? One fine little fellow there was of about four years, who was engaged upon an enormous castle, and who glanced a little curiously at the children streaming past him, but resolutely refused to budge, and was soon left in sole possession of the beach. It was pleasant to think that at least one child had not wasted a precious afternoon.

In the present chapter my chief aim is to present what I suppose to be the child-study point of view, and this point of view can, perhaps, be most clearly indicated by considering how a study of child-nature furnishes hints as to religious instruction.

The main contribution of child-study to our comprehension of childhood is found in the increased ability it gives us to fit everything into a process of development. Religion itself is regarded not as a state, but as a process, and if it be the case that children's capacity for the apprehension of religious teaching and the sympathetic appreciation of the religious spirit differ at various ages as widely as the study of children would lead us to believe, then it seems evident that the most suitable culture material at the different epochs is scarcely likely to be found in a mere simplification of the adult type of religion. Religious instruction can never become religious education until it finds a point of contact with something within the child. For want of such a point of contact a great deal of what passes as religious teaching is utterly ineffective; so much so, that a writer,[1] who claims to be intimately acquainted with four great public schools, one preparatory school of great repute, and two considerable day-schools, declares roundly that 'the average boy at school is as little influenced by the religion, whose forms he is encouraged to observe, as if God lived on Sundays only, within the chapel only, in theory only.'

From our present point of view the main suggestions for religious education are derived from the culture epoch theory. Man from the earliest times of which we have any record has been religious, and the parallel between the child and the race is nowhere more remarked than in the case of religion. Accordingly, we may expect that a knowledge of the main lines along which the race has risen in its spiritual progress will furnish us with guidance for the children of to-day.

At the same time, it must be admitted that the parallelism between the child and the race is very general, and cannot be followed exactly. In the chapter on biology we have seen that it is common for young creatures to possess traits which are not recapitulatory, but are adaptations to the present environment. Now, there is no creature whose environment during early life has changed more remarkably than that of man. And this fact is the more important, because nowhere do we find to anything like the same degree as in the human species that character which we have seen to be specially associated with the appearance of family life, namely, the power of individual adaptation to surroundings. Primitive traits may and do appear in childhood, but the child who

[1] H. V. Weisse, 'The Religion of the Schoolboy,' *Contemp. Rev.*, May, 1904.

is born into a civilized environment is influenced thereby from his earliest days. Christianity is the culmination of a process of development, but this is no reason why the spiritual development of a modern child, even in passing through a similar process, may not be Christian from the first.

Let us now consider some of the features which characterize the religious life at different periods, and note their bearing upon the subject of religious teaching.

The question whether children are naturally religious, apart from instruction, is open to discussion. For obvious reasons there are few facts to assist us in forming an opinion, but it is interesting that deaf-mutes, after being educated, have declared that although they were taken regularly to religious services in childhood, they never formed any idea whatever of the meaning of what they saw. Be that as it may, there can be no doubt that under widely differing conditions children pass through very diverse phases of development which appear to demand equally diverse methods of culture.

One of the most marked features of the religious life of young children is their credulity. Naturally enough, having no knowledge of what is possible or probable, children simply accept with little question whatever is told them, and the miraculous or the marvellous, so far from raising doubts, simply excites their interest, and makes them call for more. The little daughter of a friend was questioning her mother minutely regarding the domestic habits of the angels. Her mother replied that she was sorry she could not answer all the questions, as we really do not know very much about what goes on in heaven. At this the child looked very much astonished, and said, 'Oh, don't you know? Why, cook knows all about it!'

A second marked feature is the tendency to anthropomorphize. The child naturally interprets all he hears in terms of his own experience, and works it up into a mythology of his own. God is visaged as a great man, very big, and very grand. He is thought of as living in heaven, above the clouds, in the moon, or in a star. He is pre-eminently the one who does things, and the child may be greatly impressed by His cleverness or His power.

How crudely anthropomorphic a child's ideas may be is shown by the instance of the child, who, upon seeing a man at work upon a steeple, asked if he were God. Again, a little boy I know found one morning that the snow which had covered everything the day before had disappeared, and on asking who had taken it away was told that God had done so. Shortly afterwards there was another fall of snow, and his mother engaged a man to sweep it from the door. When the man had completed his work, the child was found earnestly questioning him, to his great embarrassment, as to whether he were God!

The omniscience of God is readily accepted by the child, to whom the doctrine simply means that God is a little wiser than his all-knowing parents. But the doctrine of God's omnipresence is much more puzzling, and is liable to suggest some of those questions which so amuse the profane. The doctrine is also rather apt to convey to the child the idea of an ever-spying eye, and may thus cause resentment or fear. 'I will *not* be spied on like that,' said one young lady, stamping her foot, when her mother attempted, somewhat prematurely, to bring home to her God's constant nearness to us. Another little child was found standing crying at the door of a room, afraid to enter lest God should be within.

It would be easy to quote endless children's sayings illustrative of the queer notions the little ones form regarding things above; but to what end? It is plain enough that young children are animistic in their ideas as any savage, superstitious to a degree, and strongly attracted by tales of the marvellous. But such general characteristics are often considerably modified by individual differences of temperament. Ritual and ceremonial make a strong impression on some children, and the childhoods of Goethe and of George Sand[1] furnish us with distinguished instances of the actual invention of dramatic religious ceremonies. In other cases the mystical temperament may manifest itself in early childhood, or a precocious rationalism may lead the child to doubt or question whatever he is taught. A lady assures me that at the age of seven she once for all thought herself out of belief in the supernatural in the Gospels, and I know two instances of boys who were suddenly convinced, upon seeing a crude representation of Christ walking upon the sea, that such an event could never have taken place. The failure to receive an immediate and satisfactory answer to prayer is a common cause of doubt in childhood. The chief importance of such early outcrops of the sceptical intellect lies in the fact that such children are apt to become secretive, fearing that their heresies may be unsympathetically received.

As regards the most suitable religious nurture during this period, one may note that the earliest religions were family or tribal. The domestic hearth was the altar. The father was the priest. To the most modern child religion is still a family affair, having its familiar ritual in these traditional exercises which early associations have hallowed to us all. But undoubtedly the dominant factor in the child's early religious nurture is the personal one. What religious impressions can compare with those which

[1] See Sully's *Studies*.

arise from constant intercourse with friends whom the child can trust, and reverence, and love?

The modern child can never have the feeling of dependence upon the forces of Nature which found expression in primitive types of religious worship, but he has the same tendency to personify the sun and the moon, the wind and the rain, and his delight in fairy-tales and wonder-stories indicates the same type of mind as wove the ancient mythologies. Hence, we expect to find in myths, Nature-stories, fairy-tales, and other forms of fiction, material of great value, capable of kindling the imagination, and warming the heart, as nothing else can do. There are, no doubt, prosaic people who object to children's heads being 'stuffed with nonsense,' and who would restrict their mental pabulum to the most literal matter-of-fact. Such a position, however, has been largely discredited, and there is even a tendency abroad to go to the other extreme.

Hence, two cautions seem to be necessary. The first is that, however little danger there may be in telling children stories which are not literally and historically true, it does not follow that those are equally harmless which are morally or religiously false. I can see no harm, for example, in tales which represent animals as talking. Indeed, such a story as 'The Mouse in the Lion's Net' may even claim to be a true story so long as it is true that the gratitude of the weak may find ways of helping the strong. But the common type of folk-tale, which holds up to admiration some quick-witted but mean fellow, who makes his way in the world by deceiving poor old women and simple-minded giants, is false and mischievous. Again, what danger can there be in the romances of the *Heroes of Asgard*, or in tales from the Roman or Greek mythologies? In a literal sense these stories are not true, but they have a nobility and beauty of their own, while the religious ideas they contain are too remote from our ways of thinking to constitute a danger. On the other hand, some of Grimm's fairy tales, such as that of the Marienkind, who was carried up to heaven by the Virgin, where she played with the little angels, and naughtily peeped into a room where she saw the Holy Trinity, seem open to the objection that they may give rise to false ideas regarding the Christian mysteries—ideas, let me remark in passing, not at all dissimilar to those which frequently result from the premature inculcation of orthodox dogmas.

The second caution is that, whenever children begin to appreciate the difference between fiction and literal truth, we should be perfectly open and frank as to what our own opinions really are. To an increasing number of people,[1] the miraculous element in the Bible, so far from being an aid to faith, as it was to our fathers, is a difficulty. Yet such people often hesitate, and rightly, to communicate their doubts to children, lest a precocious rationalism may obscure the reality of Christian history or weaken the claims of Christian discipleship. Professor Hall pleads that even those who hold advanced religious opinions, as he himself evidently does, should give the miraculous a very prominent place in the teaching of young children, but he does not explain how they may honestly do so. There can be no doubt that those who can still walk in the old ways are spared some difficult problems,[2] but for others it would seem a good rule that, while one should not be unnecessarily rationalistic with children, one should,

[1] See, for example, *Patrollers of Palestine*, by the late Rev. H. Smith. The author gives some very ingenious rationalistic 'explanations' of various Biblical miracles.

[2] Which problems have to be faced by the children themselves a little later if they ever *think* about their religion at all.

from the first, try to plant their reverence for Scripture on some foundation which cannot be shaken. After all, I do not believe children love a story less when they learn it is allegory or poetry, unless they have been drilled into the attitude of the ultra-literal school.

Problems of this kind really belong to a later age than that with which I am now dealing. Not so with many of the moral problems presented by the Bible. It is marvellous at how early an age the clear insight of unsophisticated childhood will seize upon the inconsistency between the nature of acts attributed to God and the conception of Him as a loving Father. And here the modern believer, who regards revelation as a progressive process, has surely the advantage over those who are bound by the old conception of inspiration. Even young children are quite capable of understanding that there was a time when men thought many things pleasing to God which we now know cannot please Him.

During the early school years the child's religion continues to be largely objective in character, but naturally with advancing knowledge ideas become less crude.

Earl Barnes[1] has attempted to come to some conclusions as to children's idea of God from the papers on 'Ideals,' which have already been referred to. He found that, of the English children, 7 per cent. of the boys and 14 per cent. of the girls chose God or Christ as their ideal. In the similar investigations carried out in Edinburgh the percentages were practically the same. Now, what reasons do these children give for wishing to be like God or Christ? Their reasons will doubtless be influenced largely by the teaching they have received, but none the less they may show us by what attributes of God or Christ they are in fact impressed. It was found

[1] *Studies in Education*, vol. ii.

that, out of 698 statements made, 64 per cent. refer to qualities of God or Jesus, and 49 per cent. to their activities. The qualities which were admired were love and goodness rather than power or greatness.

'The fact that so little place is given to the power and greatness of God or of Christ by these children seems to show that the kind of teaching they receive is more rational than it used to be. The fearfulness, and awfulness, and almightiness of God, which I think would not long ago have played a more conspicuous part in these papers, seem to be forgotten in a recognition of His goodness and kindness.'

Starbuck[1] also notices in his returns to a *questionnaire* regarding early religious ideas that, though fears are common, they are mentioned less frequently than trust and love. He says that, if the persons he has studied are representative, the prominence of fear in childhood has been overestimated. I should say we have here, also, the influence of the mild theology of the present day.

Starbuck's returns also show that even at this period there are differences between the religious life of boys and of girls. While, as I have said, religion is mainly objective and external, girls are in advance of boys in finding in it an inner significance. Being more imaginative and more impressionable than boys, they are more susceptible to religious influences. They express pleasure in religious observances more frequently than boys in the proportion of 17 to 7; while, on the contrary, the boys express a dislike for them more often than the girls in a ratio of 21 to 9.

After the myth-loving nursery stage, the Bible naturally furnishes the chief material for religious instruction, and

[1] E. D. Starbuck, *The Psychology of Religion*, Contemp. Science Series; Scott, 1899.

many writers have pointed out how naturally this material adapts itself to the requirements of the culture epoch theory. Thus Stanley Hall[1] writes: 'Our Bible, despite its deviations, redundancies, and gaps, when measured on such a programme, depicts the development of "man-soul" in a way which, if it is rightly understood, leaves the best classics of the best races far behind. The Old Testament begins with the myth of cosmic virgins, and passes to the agricultural and pastoral stage of Cain and Abel, the heroics of Abraham, Isaac, Jacob, Moses, and Joshua, the royalty of Saul, David, and Solomon, the legal stage of law and justice which so appeals to boys, to dawning prophecy, etc. It is all objective, strenuous, full of incident, battles, dramatic incidents, and with a large repertory of persons. There is fear, anger, jealousy, hate, but not love, and it depicts an age of discipline and authority. Later comes the adolescent New Testament stage, with its altruistic motives, and, last, the philosophic age of Pauline and other doctrines which appeal to the intellect. All this is normal and in pedagogic sequence, the order of which should not be reversed, as is so often done in religious teaching.'

According to such a scheme the Old Testament would furnish the chief material for religious instruction during the early school period. The child has now passed beyond the myth-making period. He belongs to the stage in which men were grouped in tribes or larger communities; in which the earlier polytheistic ideas were giving place to a monotheism, in which God was regarded as the supreme power ruling men from without by laws and codes. The child at this stage is still 'under law.' He is governed largely by authority. Among his companions custom and tradition are his chief guides to

[1] *Adolescence*, vol. ii., p. 360.

conduct. To a very large extent an act is right or wrong according as it follows tradition or outrages it. In his games rules must be rigidly adhered to.

Of the actual religion of schoolboys Mr. Weisse, whom I have already quoted, writes thus: 'As a matter of fact, every schoolboy is deeply religious, only the religion taught by periodic chapel services is utterly eclipsed by a religion inculcated at every turn by the traditions and practical conditions of his daily life. . . . Like all false religions it has at first sight many beauties; it rests on specious travesties of such high aims and principles as Manliness, Honour, and Ethical Solidarity. . . . If we examine the schoolboy's ideal of honour, do we come near, or even within measurable distance of, the thing itself?'

Now, what suggestions for religious and ethical training do we find in the characteristic traits of this period? Perhaps the tendency to be guided by rules and customs may indicate an opening for definite moral teaching on some such lines as those advocated by the Moral Instruction League; but such teaching, if it is to come home to the child's heart and conscience, must deal largely with such simple problems as meet him from day to day. The actual religion of schoolboys is not so much a false religion, as Mr. Weisse says, as an immature religion, and, far as the boy's conceptions of manliness and honour fall short of the real things, the great point is that the boy is aiming at ideals at all. Here the growing tendency to hero-worship furnishes the opportunity of bringing the boy into vivid relationship with a larger and nobler life than that around him. The culture theorists claim that the Old Testament furnishes material peculiarly suitable for this stage of life, its great men being of the heroic type which appeals to the instincts of boyhood. Much use should also be made of extra-Biblical material, and a knowledge of the great deeds of his country's heroes should be counted an essential part of the education of every boy. Surely every English boy should feel his pulse quicken and his heart rejoice as he drinks in the bravery, and the strength, and the moral dignity of such lives as John Davis, and Sir Philip Sidney, and Drake, and Raleigh, and Lord Thomas Howard, and other 'indomitable God-fearing men, whose life was one great liturgy.' And to these, as the boy's sympathies grow and his mental outlook widens, one would add heroes of other types—the great geniuses of literature, the discoverers of science, the promoters of the arts of peace.

Towards the end of this period—that is to say, when boys are about twelve years of age—we find appearing that tendency to organize in groups which I have referred to as the gang impulse. How this tendency, which becomes more marked as adolescence advances, may be utilized for the purposes of religious training is shown by the success of such organizations as the Boys' Brigade.

Coming, now, to the adolescent period, we discover a marked increase of interest in religion, and especially an increase of feeling for its inward significance. Out of 598 young people, Lancaster[1] found 518 who, between the ages of 12 and 20, experienced new religious inclinations. He concludes that 'religion before this age was a mere form. Now it becomes full of meaning. It is a new interest, and very many speak of it as a sudden awakening. It is often spontaneous, like the interest in art or music, or the love of nature. Where no set forms have been urged, the religious emotion comes forth as naturally as the sun rises.'

The moral, the æsthetic, and the intellectual interests

[1] 'The Psychology and Pedagogy of Adolescence,' *Ped. Sem.*, vol. v., 1897.

undergo a marked heightening during this period, and such heightening must obviously influence religion. In some cases an awful sense of the majesty of the moral law, the stirring of profound emotion by the beauty of nature, art, or music, or the impression created by the scientific revelation of the cosmos, seems to take the place of religious feeling. More commonly, as the personality reaches forward towards fuller life, the religion of childhood undergoes a transformation, a spiritualization, a readjustment to the new interests and fresh ideals. But the endeavour to reconcile religion and science, creed and practice, the Church and the world, is apt to involve a considerable amount of friction. Hence the morbid conscience of adolescence, the prevalence of doubt, the sense of sin.

The most striking phenomenon of this period is sudden religious conversion. Conversion has been carefully studied in recent years by quite a number of psychologists, and some interesting conclusions have been come to. All observers agree that conversion is closely associated with adolescence. The great majority of conversions occur between the ages of ten and twenty-five. According to Starbuck,[1] the age at which the largest number of conversions occurs is sixteen. This large wave of religious awakening is preceded by a smaller wave at thirteen in girls, and at twelve in boys.

Such facts suggest, and fuller study confirms, the idea that conversions occur in accordance with law. This idea has been worked out in a most interesting manner by Professor James,[2] who tells us that so many of the peculiarities which attend conversion are met with in other types of religious development that the conclusion

[1] *The Psychology of Religion*; Scott, 1899.

[2] *The Varieties of Religious Experience*; Longmans, 1902.

can scarcely be avoided that what makes the difference between a sudden conversion and a gradual religious awakening 'is not necessarily the presence of divine miracle in the case of one, and of something less divine in that of the other, but rather a simple psychological peculiarity—the fact, namely, that in the recipient of the more instantaneous grace we have one of those subjects who are in possession of a large region in which mental work can go on subliminally, and from which invasive experiences, abruptly upsetting the equilibrium of the primary consciousness, may come.'

According to this view conversion is the birth of a new ego, the awakening of a new and wider spiritual consciousness. Conversion is thus a genuine spiritual experience, but it is not a wholly unique experience, and the level of spiritual development to which the convert attains is reached by many who are conscious of no such crisis. This seems a rational view of the matter. The tree is known by its fruits, and the fruits of the Spirit are certainly not more conspicuous in the converted than in many who cannot tell the day and the hour of their second birth. No doubt many religious people will regard such views as these with some degree of horror, but many may be glad of a compromise between the orthodox dogmatism which regards every conversion as a miracle and the scientific dogmatism which can see in it only hysterics.

The study of adolescence, then, seems to show quite clearly that this period of life presents opportunities for religious teaching which occur at no other time, and modern psychology confirms the wisdom of those religious bodies which pay special attention to the training of their young people at this stage, and mark by special rites or ceremonies the fact that a new stage is being entered upon.

The tendencies to hero-worship and to organize in groups continue to grow in strength during the early part of this period, and the various religious organizations for young people which have come into such prominence during the last half-century are both an evidence of the growing social spirit and an example of the means through which some of the needs of young people may be met.

But perhaps the most clamant need at this time is a confidential and sympathetic relationship with a mature mind. Well is it for the youth who can find in his parents the friends he needs; for the parents who have secured the confidence and trust of their children. It is just at this point that the old-fashioned repressive methods of discipline reveal their weakness, as Youth steps forth into Life not knowing whither he will go.

The rapid progress of intellectual development would seem to indicate that this is the proper time for what is called 'definite religious teaching' rather than the early years, in which the most extraordinary and bizarre conceptions are liable to result from indoctrinating young children with theological ideals which they are totally unable to understand.

The growth of sentiment requires careful cultivation. Young people now become able to appreciate more fully what is taught concerning the subjective side of religion. They recognize within themselves the light which lighteth every man coming into the world. Religion becomes a spirit of life within the heart, and the great principles of love and self-sacrifice now make their appeal. If the Old Testament is in some respects specially suited to the tastes and interests of younger children, the New Testament is peculiarly adapted to the needs of adolescents.

Ought we to expect during this period such a crisis as conversion? 'Except ye be converted,' says the Master, 'ye cannot enter the kingdom of heaven.' But conversion, as we have seen, consists essentially in the turning away from a lower self, now realized as imperfect or sinful, to a higher self, which surrenders its will to the claims of a larger and more enduring life of which it forms a part. This transition from a lower to a higher self may take place by a sudden crisis, by a process of awakening, or by insensible growth. Its value does not depend upon its suddenness. The Churches tend to regard one particular type of this transition as the only true one, but as the differences apparently depend in part upon individual peculiarities, and in part on differences in early training, it would seem desirable that the Churches should learn to adapt their requirements more directly to individual needs.

The imaginative faculties now become able to grasp sequences of cause and effect, and history can be understood as a process, and not a mere series of disconnected events. And here we gain the first-fruits of teaching the Bible, as has been suggested, in a 'pedagogic sequence.' When children study[1] Genesis during one period, a Gospel during the second, then the wanderings in the wilderness, and then the Book of Acts, the whole history is apt to become a strange jumble; and we find the children forming such confused ideas as that Joseph, who was sold into Egypt, afterwards married the mother of Jesus. But with improved methods of teaching, including a proper sequence of studies, and the use of such aids as time-charts, the

[1] The international lesson system has undoubtedly done much to improve Scripture teaching, but it has glaring shortcomings. For a criticism of these, see *The Pedagogical Bible School,* by S. B. Haslett (New York), 1903, and *Reform in Sunday-School Teaching,* by A. S. Peake (Clarke, 1906).

mind simply jumps at the idea that the book of lives is a book of *connected* lives, and the scenes which have been familiar from childhood fit themselves naturally into the story of the unfolding of a Divine purpose in the development of a people.

But although the Old Testament furnishes much material which is specially suited to the tastes and interests of young children, while the New Testament contains much which can only begin to be appreciated in adolescence, it is obvious that the recognized value of sequence and continuity must not obscure the fact that other things have to be taken into account in planning our teaching. There is a great deal in the New Testament that appeals to very young children, just as there is much in the Old which is altogether beyond them. Long ages preceded the appearance of Christianity, but even the most extreme of the supporters of the theory of parallelism would not propose to rob the children of the 'sweet story of old.' At the same time our present point of view suggests the question whether, in teaching young children, we should not be content to aim at conveying to the child's mind a conception of Christ not too far removed from his own experience to become a vital part of his thought. Such a conception would necessarily be inadequate and incomplete from the adult or dogmatic standpoint, but this does not mean that it would be untrue. On the contrary, the vivid picture of Jesus as a real man, who 'lived, and ate, and stood, and walked about,' would prepare the mind for those more abstruse conceptions of Christ's person, and of His relation to the individual soul, which are appropriate to the period when the soul itself, in the fullness of time, springs into conscious existence, and adolescence brings with it the sense of inner need.

Any discussion of this important subject would be altogether beyond the scope of the present chapter, which aims simply at the illustration of a particular point of view; but I think it would be well if, in our religious teaching, we could take to heart the wise words of Comenius, that we ought to sow, not plants, but seeds. And surely, before sowing the seed, we should prepare the soil.

CHAPTER XVIII

PECULIAR AND EXCEPTIONAL CHILDREN

'The little more and how much it is,
The little less and what worlds away.'

CHILDREN who differ from their fellows in any important respect are worthy of special study, partly for their own sakes, and partly because their peculiarity may throw light upon the normal type. As variations may occur in all directions, it is not possible to adopt any but a very rough and ready classification of exceptional children. The present chapter, therefore, must be of a somewhat miscellaneous character.

PECULIAR AND EXCEPTIONAL CHILDREN.

Reference may be made in the first place to Mr. Bohannon's[1] study of peculiar and exceptional children. In response to a syllabus, Mr. Bohannon obtained particulars regarding 1,045 cases of children who differed markedly from their neighbours. Amongst these may be noted, firstly, some whose peculiarity was physical. These were:

(*a*) *The Heavy*, including a boy of twelve, weighing 172 pounds, and 4 feet 7 inches tall; a girl of eight, weighing 100 pounds, and 4 feet tall; a girl of seven, who weighed 140 pounds at five.

(*b*) *The Tall*, including a girl of seven, who is 5 feet tall;

[1] E. W. Bohannon, *Ped. Sem.*, vol. iv., 1896-1897, p. 3.

a girl of thirteen, who is 5 feet 8 inches; and a girl of fifteen, who is 6 feet.

(*c*) *The Stout*, including a girl of thirteen years, who weighs 104 pounds.

These children are usually dressed like their seniors, and more is expected of them on account of their size. They often appear to be above the average in health and mental ability.

(*d*) *The Small*, including a girl of seven years eight months, whose height is 2½ feet; a girl of twelve, whose height is 3½ feet; a female of twenty-two, whose height is 2 feet 2 inches, and who is an imbecile; and a male of thirty-four, whose height is 3 feet.

Such people are usually dressed as if younger than they really are. Some are very active in mind and body, but a good many are feeble-minded or otherwise degenerate.

(*e*) Examples are quoted of children who are exceptionally strong or weak, agile, deft or clumsy, beautiful or ugly. With regard to exceptionally beautiful children the author remarks that, 'No other one of the classes studied receives an amount of attention so unusual. In no other class is the evil effect of unusual attention so apparent. In very few instances has it not been the most obvious cause in producing vanity and its related qualities, as selfishness, unkindness, haughtiness, pride. They have been "petted," "indulged," "flattered." . . . Perhaps those who are guilty of doing such incalculable harm to helpless children excuse themselves upon the ground that it is out of good-will and admiration, but none the less it is a great wrong, and one which common sense would do much to correct.'

In the second place, a number of psychical peculiarities noted included—

(*a*) *Mental Precocity.*—Many of these cases are pathological, and require quiet rather than stimulating surroundings.

(*b*) *Mental or Speech Deficiency*.—These require special instruction and training. The public school is not the place for them.

(*c*) *The Clean*, (*d*) *the Dainty*.—The associated peculiarities often met with in these cases are orderliness, obedience, truthfulness, slowness, nervousness, fussiness. The children are not unfrequently delicate, and are often beautiful. Sometimes the peculiarity becomes distinctly morbid, as when a child washes his hands every few minutes, or will not join in play lest he may soil his clothes.

(*e*) *The Dirty*.—These children are often healthy and energetic, but disorderly and disobedient.

(*f*) *The Cruel*.—Cruelty may originate in the exercise of power over weaker living things. Teasing is an allied trait. Much childish cruelty is due to ignorance. A young child who pulls a fly's wings off out of curiosity may not have the very slightest notion that the fly may not like the process. I have known a child who had been amusing himself in this way most bitterly grieved on being asked the suggestive question, 'How would you like a big giant to come and pull your arms off?'

(*g*) *The Courageous*.—These are usually healthy and strong. They are often quiet and reserved, as well as generous and obedient.

(*h*) *The Timid*.—Timidity evidently has a physical basis. Signs of this predisposition are nervousness, weakness, and bad health generally. Very often the fear has been made use of to secure the enforcement of command, a practice as dangerous as it is savage and cruel.

(*i*) Among other traits referred to are abnormal curiosity, loquacity, gluttony, peevishness, untruthfulness.

The author thinks that the reports he has collected show a great want of appreciation for the individual and the peculiar. They emphasize the necessity, both for student and teacher, of the careful study of individual children. Many children are needlessly, almost criminally, misunderstood by those from whom they had a natural right to expect appreciation. 'The easy disregard with which this right is so often overridden in the name of method, system, or discipline, suggests the influence of brutality rather than that of science. The mental suffering and anguish which defectives of the various classes are compelled to endure as a result of the stares and low curiosity of others is barbarous. The undue and excessive regard bestowed on those of the opposite kind is scarcely less disastrous in its effects, even though it is personally agreeable to the subject.'

ONLY CHILDREN.

Of the 1,045 children described in Mr. Bohannon's[1] returns, no less than 46 were stated to be 'only children,' although none of the questions in his syllabus referred to such children. This seemed a very high proportion, and suggested that only children may have a special tendency to exhibit peculiarities. Mr. Bohannon therefore endeavoured to obtain particulars regarding such children, and succeeded in obtaining information regarding no less than 381 cases.

As the result of his study of these cases Mr. Bohannon has come to the following conclusions:

1. Only children are unmistakably below the average in health and vitality.

[1] E. W. Bohannon, 'The Only Child in a Family,' *Ped. Sem.*, vol. v., 1898, p. 475.

2. Nervous disorders seem to be unusually common in the families.

3. The children appear to enter school later, and to be less regular in attendance than other children.

4. They have less command of themselves socially than other children, and their social relations are therefore more frequently characterized by friction.

5. Unusual precocity is common.

6. Many of them indulge in imaginary companionship, to compensate for inadequate real companionship.

7. Selfishness is most frequently named among the worst traits, and affection among the best traits.

8. As a rule, the home treatment has been that of unthinking indulgence.

The persons making the reports almost unanimously agree that there should be far less indulgence; that a more uniformly firm and natural method of control should be followed; that age considerations should have more influence; that such children should not be so constantly with parents and other elderly persons, but more with children of their own age, and thus learn how to share with, and yield somewhat to, others; that the undue anxiety and concentrated love of parents should yield to a more intelligent appreciation of the wants of the child, who is in much greater need of discriminating attention than of the lavish bestowal of misguided affection.

TWINS.

The frequency of twin pregnancy is variously estimated at from one case in ninety to one case in one hundred and ten. In Ireland the frequency is greater than in Great Britain.

Twins are of two varieties. Each child may be derived from a separate ovum, or both children may arise from the same ovum. In the latter case both children are invariably of the same sex, but twins of the same sex are not necessarily of this variety. Uniovular twins are the less common variety, occurring in about one out of six or seven cases.

More than twenty years ago Mr. Francis Galton[1] investigated the history of as many twins as he could hear of, in the hope that their history might afford means of distinguishing between the effects of tendencies received at birth, and of those that were imposed by the special circumstances of their lives.

It might be expected that twins would be found to have a general average resemblance to one another, a few greatly exceeding the average likeness, and a few markedly falling short of it. Mr. Galton's returns, however, showed that this was not the case, but that extreme similarity and extreme dissimilarity between twins of the same sex were nearly as common as moderate likeness. When the twins were a boy and a girl they were never closely alike.

Particulars were obtained regarding eighty cases of close similarity. In some of these cases not a single point of difference could be specified. The resemblance is not merely external. The character and disposition of the twins may be strikingly alike. They often think alike, and are apt to make the same remarks under similar circumstances. Even their ailments may be similar. Thus, a parent of twins says, 'If anything ails one of them, *identical symptoms* nearly always appear in the other.' Trousseau is quoted as describing an instance in his own practice where one twin had an attack of ophthalmia in Paris, while his brother, then in Vienna, developed a similar attack. Judging by the description, both appear to have been liable to ophthalmia, though this is not stated. The same twins were very asthmatic, and neither

[1] *Inquiries into Human Faculty*, 1883, p. 216 *et seq.*

of them could stay in Marseilles, where their business required them to go, without having an attack.

Since Mr. Galton's observations were published a number of similar instances have been observed. Thus, Dr. Clouston[1] refers to twin brothers of the same temperament and disposition, both indulging to great excess in wine, both following a similar occupation, and both affected by general paralysis within a year of one another.

Now, in cases of this kind, where we have twins described as 'closely alike' in mind and body, and brought up under the same conditions in childhood, the very interesting question arises, 'Does this close similarity continue in adult life when the general conditions change?'

In Mr. Galton's cases close similarity continued unaltered, in some instances even to old age; in others the parents ascribed such dissimilarity as there was wholly, or almost wholly, to some illness. In some cases there was a growing dissimilarity, for which no external cause could be assigned, and which, in Mr. Galton's opinion, must have been due to want of thorough similarity in nature. Indeed, in some instances it was distinctly affirmed by the friends that the growing dissimilarity could be accounted for in no other way.

Particulars of *dissimilar* twins were obtained regarding twenty cases. These seem to bear out the view that nature is stronger than nurture. Thus, one father writes of his boys: 'They have had *exactly the same nurture* from their birth up to the present time; they are both perfectly healthy and strong, yet they are otherwise as dissimilar as two boys could be—physically, mentally, and in their emotional nature.' Mr. Galton admits the important influence of early teaching, but asserts that there is no escape from the conclusion 'that nature prevails enor-

[1] *Mental Diseases*, third edition, 1892, p. 393.

mously over nurture when the differences of nurture do not exceed what is commonly to be found among persons of the same rank of society in the same country.' As to early training, those teachings that 'conform to the natural aptitudes of the child leave much more enduring marks than others.' Hence children instinctively assimilate the habits and ways of thought of parents whom they resemble, while 'the instructions of a foster-mother are soon sponged away.'

Genius and Precocity.

One of the most remarkable features of childhood is the extraordinary rapidity alike of physical and mental development. During the first few years the intellectual progress is so great that it may truly be said that every child learns more before he goes to school than he ever learns from his schoolmaster. Goethe has declared that if children could only keep on as they begin they would all be geniuses when they had grown up. If this is so, a genius is simply a man whose talents have carried him a little further than his fellows. But whatever genius may be, it seldom delays till adult life to show itself. One often reads of eminent men that they were little accounted of at school, but statistics show clearly enough that genius is usually precocious. The artistic impulse is particularly liable to show itself early. Musical talent practically invariably manifests itself in childhood, and when exceptionally developed may render its possessor famous long before he reaches his teens. Artists, also, usually manifest their bent at an early age. A large proportion of scholars and men of science are precocious in childhood, but their particular bent may be less decided than in those of the artistic temperament.

Although genius tends to be precocious, precocity by no means implies genius. Indeed, a very marked precocity, especially if it takes the form of the very early manifestation of some special talent, gives reason for anxiety rather than for rejoicing, for experience shows that such children very rarely fulfil their early promise, and not infrequently they die young. Two points seem to be specially important as regards their nurture. The first is that great care should be taken of their bodily health. Galton's statistics show that very eminent men are, on the whole, of exceptionally good health and physique. Precocious children, on the other hand, are frequently of the thin, neurotic type, and the alertness of their minds is the more striking in contrast to their thin, undersized bodies. In all such cases attention to the bodily health is evidently of paramount importance, and the chief means to this end are an open-air life, abundance of sleep, and a non-stimulating, fattening diet, while lessons are allowed to be more or less in abeyance.

The second point to note is that one must specially guard against promoting a one-sided development. The natural tendency is to encourage in every way the special talent present; and certainly if there is special talent one should do nothing to suppress it. But, as a rule, a special talent, if really present, can take care of itself, and the educator should take special pains to secure a good all-round development.

THE BLIND.

Anyone who is in doubt as to the efficacy of education in promoting mental development should study what modern methods are capable of achieving in the case of children suffering from deprivation of one or more of the senses. Children who have been blind from birth, or who have lost their sight in infancy, are usually very helpless little mortals when they first come to school. They are often unable to dress, and sometimes even to feed, themselves. They are slow in their movements and disinclined for exercise. They will often sit still for prolonged periods, whereas a normal child would not remain motionless for an instant. Mentally they are usually much behind their more fortunate companions. As a result of their training, however, these same children may acquire a very high degree of education. They leave school physically strong, with full control over their bodies, capable of making their way without assistance through the streets of the town, and even able to find pleasure in active exercise and in outdoor games. Intellectually they are not at all behind other people of their own age who have 'all their senses about them.' Their musical capacities are well known. They are able to learn various trades, and some, especially the more musical, may earn good incomes.

The education of the blind naturally involves a careful training of the senses which remain. The sense of touch especially is perseveringly cultivated to furnish those ideas of size, shape, position, etc., which normal persons obtain chiefly through their eyes. Many wonderful stories are told of the acuteness of touch of blind people, but there seems to be no reason for believing that the blind are endowed by a beneficent Nature with a preternatural sensitiveness to impressions of contact. Their superiority in this respect is entirely due to training.

The hearing of the blind is also as a rule acute, because by this sense they judge the position and distance of objects which produce a sound. Moreover, they listen carefully to the tone of voice of those speaking to them, in order to judge of the character, temper, sincerity, or earnestness of the speaker. Conversation is a great pleasure to them, and is naturally a highly important means of increasing their knowledge of the world about them.

The idea of teaching the blind to read by means of raised characters first occurred to Valentin Haüy about the year 1783, and he successfully carried his idea into practice. Since his time a large number of alphabets have been introduced for the use of the blind. Of these the most used at the present day are the Moon and the Braille.

The Moon type is of large size, and is based upon the Roman letters. It has the advantage of being easily learned by those who lose their sight in adult life, but books printed in it are very bulky and very expensive.

The Braille type is very ingenious. It was invented by a blind man. The letters are represented by raised dots, of which the maximum number in a single letter is six. Books can be printed in Braille at a comparatively cheap rate. The letters are of moderate size, and both sides of the paper can be printed on. Moreover, it is possible, by means of a brass guide and a style, to write in Braille, so that one blind man can write to another.

It is obvious that the education of the blind can only be undertaken by specialists, but a good deal can be done for blind children before they are old enough to go to school. The following hints, which I quote from an article I have written recently,[1] may be useful:

'Teachers of the blind complain that, when children come to them, they do not know how to use their hands; that they are lacking in confidence, and can do nothing for themselves; that their muscles are soft and weak; and that, in short, a great deal of time has to be given to exercises and gymnastics intended to train the muscles

[1] Article, 'Blind,' written for the forthcoming *Cyclopedia of Psychology and Religion*, edited by the Rev. James Hastings.

and the sense of touch before education in the school sense can be started. These faults depend very largely on the fact that the child's relatives, not unnaturally, have done everything for him. They have dressed him, washed him, and fed him. They have led him from place to place. They have, perhaps, never thought of giving him toys to play with. They have prevented him from going about by himself for fear of accidents. In some cases they have even kept the child in bed for years, or taken him about in a perambulator in case he might hurt himself. Such treatment, though kindly meant, is really cruel to the child. The proper course of procedure is quite the opposite. The proper method of dealing with a young child who is blind may be expressed in a sentence: *Treat him exactly as if he could see.* The child should have toys to play with as soon as he can grasp. When he can creep about he should be allowed to do so. He should be expected and encouraged to walk as soon as other infants. Nor should too much care be taken to prevent such accidents as walking against a chair, for if the child is ever to learn to walk about freely without running against walls and lamp-posts, he must learn by hard experience in his nursery days. So, also, as he grows older, he should be encouraged to feed himself; to dress, and later to undress, himself; to fetch and put away his toys and other possessions. Many of the kindergarten occupations are useful for the purpose of teaching him to use his hands. The handling and threading of small beads is useful for training the sensitiveness of the finger-tips, and preparing them for the study of Braille.'

THE DEAF AND DUMB.

Like the blind, the deaf and dumb suffer from the loss of a single sense—in this case, the sense of hearing. If hearing is lost in infancy, speech fails to be acquired, and it very frequently happens that it is on account of the backwardness of the child in learning to speak that medical advice is sought. The parents often have no suspicion that the child is deaf. I have been assured by the parents of a deaf-mute, three years of age, that the child could understand every word that was said to her. In reality the child was completely deaf.

The reason the deafness is so often overlooked is that the children are often bright and intelligent, are very observant, and very quick at interpreting signs. The practically involuntary signs which adults make in speaking to a young child are quite sufficient to convey a meaning to the deaf-mute, who thus gets the credit of understanding the speech he cannot hear. Moreover, the children are very sensitive to vibrations, so that they may turn round when a door is opened or closed, or when some one approaches them from behind. Naturally such movements are deceptive, and readily mislead those who do not suspect the existence of deafness.

To most of us it would be a much greater misfortune to become blind than to become even completely deaf. It may seem, therefore, a less misfortune to be born deaf than to be born blind. That it does seem so is indicated by the fact that the philanthropic public subscribe much more generously to asylums for the blind than to kindred institutions for the deaf. Nevertheless, congenital deaf-mutism is really a much more serious misfortune than congenital blindness. The reason for this is that the deaf are much more completely shut off from their kind. The blind child learns to speak like other children. He thus gains unconsciously all that education which children gain from the conversation of those about them. Whenever anything puzzles him he can ask for information. Books can be read to him, and when he has learned to read for himself there is now available for his use a large body of literature. In short, he has open to him the chief avenues of human culture. But the misfortune of the deaf child is not merely that he cannot hear, but that he has no speech, and that it is extremely difficult to give him any. No matter how his curiosity may be excited by the things he sees or by the actions of other people, he remains shut up within his own resources. He cannot play the part of an animated mark of interrogation, as the average child does for years. But he can learn to read ordinary books, to speak with his fingers, even to read the lip movements of a speaker, and in some cases to speak himself? Yes, all this is true, but to teach the deaf child is an exceedingly slow and difficult process because everything has to be explained. To teach the child the written, printed, or manual signs for various concrete objects is the easiest part of the task. But even this is very much more difficult than in the case of a hearing child, because the latter, when he begins to learn to read, already knows the names of common objects, but to the deaf-mute every written or printed word is simply an altogether arbitrary sign for the object indicated. The real difficulty, however, is realized when it becomes necessary to teach abstract words and their meanings. This difficulty is so great that it can be surmounted only by extraordinary patience and perseverance on the part of both teacher and pupil. The difficulty is, indeed, so great that I believe it is rather exceptional for a deaf-mute to acquire sufficient language to be able to read even simple books with any pleasure. The deaf-mute, in short, may be taught to take care of himself, to mix in society, to support himself by manual work; but he is in most cases shut off for life from the enjoyment of literature and poetry, and from the higher reaches of thought.

In the case of deaf-mute children there is little that can be specially attended to before school age. If the children are healthy and intelligent, no particular difficulty presents itself during the first three years of life. After this the children are apt to become discontented because they cannot understand what is said to them. When they play with other children misunderstandings and quarrels are frequent. Soon 'the dumbie' wins a character for bad temper, which teasing companions take pleasure in arousing. The result is that the child becomes fretful, irritable, disobedient, and unruly, and is often sent to school with the character of being altogether unmanageable. Not unfrequently the schoolmaster gets a hint that the child's temper is so ungovernable that it is not safe to leave him alone with other children. This bad character is usually found to be quite undeserved. When the child finds himself living amidst new conditions, surrounded by companions afflicted like himself, and under a strict but kindly discipline, he submits himself at once to the new life, and conducts himself as he sees others do.

The educational inferences which we may draw from these facts seem to be that the young deaf-mute should be protected from the teasing ways of thoughtless children; that he should be well supplied with toys of an interesting and instructive character; and that he should from his earliest days be trained in habits of tidiness, cleanliness, and order. It has also been suggested that something may be done towards familiarizing the child with verbal symbols by attaching to the different objects in the house their names printed upon pieces of card. The suggestion is a good one, but too much benefit need not be expected from it.

Deaf, Dumb, and Blind.

The most marvellous examples of the substitution of one sense for others are undoubtedly the cases of Laura Bridgman and Helen Keller.[1] Both girls were deaf, dumb, and blind, and would have remained in a condition of virtual idiocy had it not been for the patience and genius of their teachers. In both cases, however, the mental faculties were awakened and cultivated through the sense of touch, and both became eventually intelligent and happy members of society. For further details the reader is referred to the very interesting biographies which have been published.

Coloured Audition.

This phenomenon is characterized by the association, in certain individuals, of certain sounds with a subjective sensation of colour. The vowel-sounds are particularly apt to appear coloured. The colours may be stable over a number of years. The phenomenon may be hereditary. A boy of thirteen, who had never heard the condition spoken of, was discovered at school to have coloured audition. When he went home and told his mother, she said she had the same peculiarity, and the vowels bore the same colours, but the diphthongs were different in the two cases.

M. Lemaitre[2] has published a very interesting case of coloured audition of an extreme degree. A little boy of seven amused himself one July day by trying to look at the sun. He then lay down on the grass and slept for three or four hours. He was awakened by a young herdsman, who shook him and cried, 'Get up.' As the herds-

[1] *Laura Bridgman, Dr. Howe's Famous Pupil*, Howe and Hall; *Story of My Life*, Helen Keller.

[2] Aug. Lemaitre, *Arch. de Psychol.*, t. iii., February, 1904, p. 164.

man addressed him he was astonished to notice against the man's chest vivid colours, appearing and disappearing with the words of the speaker. From that time to the present the phenomenon has persisted. Let him hear any words whatever, even a low whisper, and immediately colours are visualized upon a wall, a book, a sheet of paper, etc. The colours are not constant for the various words. The same word may be blue one day and red another.

The phenomenon is frequently very annoying. For example, at school the boy cannot write while a sentence is being dictated on account of the projection of the colours on the paper. In a crowd his eyes become dazzled by the succession of colours, and he cannot see where he is going. It is only the human voice that produces colours. Other sounds, such as musical instruments, do not cause them, nor do words reproduced by the phonograph.

Congenital Word-Blindness.

This is a very curious condition for which school-teachers should be on the outlook. It was first described by Dr. Hinshelwood in 1900. It appears to be due to a failure of development in the part of the brain specially concerned in the interpretation of writing or print.

The children affected may be perfectly bright and intelligent. Their speech is normal, but they fail to make progress in reading. After a year at school they may be unable to recognize even the letters with certainty, and even after several years they may be unable to read the simplest passage. Curiously enough, they usually have no difficulty with figures, and may keep up with the rest of the class in arithmetic. Their sight is usually supposed to be at fault, and most of the cases described have been discovered by oculists, to whom the child has been sent to have the eyes tested. The ability to recognize figures is itself sufficient to show that the condition is not due to impaired eyesight.

The condition is not necessarily incurable, for under special individual tuition the children may make progress, and eventually may be able to read without hesitation, and to enjoy it.

Mentally Defective Children.

The term 'mentally defective' is applied to children whose mental development is below that which is normal for their age, owing to some defect in the brain. The brain defect may be of the nature of some congenital abnormality of structure, or may be the result of injury or disease. Injury to the brain at the time of birth is a not uncommon cause of mental deficiency, and is usually associated with other symptoms, such as paralysis.

Mental deficiency should be distinguished from mere backwardness, such as may be present in a child who has suffered from much illness, or whose education has been neglected. It should also be distinguished from the backwardness due to impairment of one or more of the senses. We have already seen that a child who is both deaf and blind, if not very carefully taught, will be little above the level of idiocy, although the brain structure may be perfectly normal. But even a partial defect of a single sense, and especially slight deafness, may result in a degree of backwardness which might easily be mistaken for mental deficiency.

Mental deficiency naturally varies very greatly in degree. In the slightest cases the children simply fall behind their fellows in the class work in school, but may make good progress under careful individual tuition, and may even be able to join their class again. At the other extreme are children who show little or no sign of mental development from their infancy. They may grow in body, but remain helpless babies all their lives.

The lowest grade of mental deficiency is usually termed idiocy, while the term imbecility is applied to a less decided degree of mental incapacity. It must, however, be understood that no absolute line of distinction can be drawn between the various grades of idiocy, imbecility, and simple feeble-mindedness. From the lowest idiot up to the normal individual there is a continuous ascent in the scale of intelligence.

There are very rare cases of imbeciles who are quite unable to look after themselves, but who yet possess marvellous capacities in some particular direction. These *idiots savants* may, for instance, have an extraordinary memory for certain items, or may be able to work complicated calculations in their heads. I have seen a case of the kind who could give one off-hand the number of any hymn in *Hymns Ancient and Modern* of which the first line was quoted to him; or if a number was mentioned, he would repeat the first line of the hymn. He could also tell correctly the date of Easter for any given year. For example, if one asked him the date of Easter Sunday thirteen years ago or nineteen years hence, he would, after a short period of mental calculation, name the correct date. He could not, however, explain how the calculation was made.

Classification.—In his well-known work on *The Mental Affections of Childhood and Youth*, Dr. Ireland adopts a pathological basis for his classification. The principal groups which he distinguishes are as follows:

I. *Genetous Idiocy.*—This is a miscellaneous group in which the mental defect is due to heredity, or to some diseased condition, entailing deficient mental manifestation, which is complete before birth.

II. *Microcephalic Idiocy.*—While the size of the head varies in normal persons, it seems that a head with a circumference of less than seventeen inches is too small for normal intelligences. Ireland applies the term microcephalic to all heads below this size. In some cases the sutures between the cranial bones become prematurely united, even in very early infancy. This led to the belief that the early ossification of the skull prevented the growth of the brain. For this view, however, there is no sufficient justification. The so-called 'Aztecs,' who were exhibited all over the country some years ago, were examples of microcephaly.

III. *Hydrocephalic Idiocy.*—This affection is popularly known as water in the head. Excess of fluid in the ventricles of the brain leads to expansion of the brain as well as of the skull. The head becomes large and globular, and may attain an enormous size. The children so affected are usually of delicate bodily health, and may be subject to fits. The mental condition varies considerably, and cannot be gauged from the size of the head. Thus Ireland quotes from Seguin a case where the circumference of the head was thirty-seven inches, but where there was a fair amount of intelligence.

IV. *Eclampsic Idiocy.*—These cases are ascribed to fits—usually a succession of severe fits—occurring in infancy.

V. *Epileptic Idiocy.*—This term is applied to cases where the epilepsy appears to be the cause of the idiocy. Epileptiform convulsions are of not infrequent occurrence among idiots belonging to Class I.

VI. *Paralytic Idiocy.*—These cases are due to lesions of the brain. As the affected limbs are well nourished, and are capable of reflex movements, the paralysis frequently escapes notice until the child is some months, or even as much as two or three years, old.

VII. *Traumatic Idiocy.*—Idiocy due to injury of the brain.

VIII. *Inflammatory Idiocy.*—Idiocy due to inflammation of the brain.

IX. *Cretinism.*—This is a peculiarly interesting form of idiocy. The affected children usually appear quite normal at birth, and their relatives see little amiss with them till they are several months, or even several years, old. The symptoms appear gradually and tend to get worse. The children are usually very apathetic, and have a stupid expression. They may be stout, but are of abnormally short stature. Their features are somewhat bloated, their eyes are dull, their lips thick, and their mouth large. The thick tongue is often protruded between the lips. The limbs are short and thick, and the gait is awkward.

The special interest of these cases lies in the fact that the condition has been found to be due to defective secretion on the part of a gland which lies in the front of the neck. This is the thyroid gland. In marked cases of cretinism this gland is absent altogether, or is replaced by a mass of fatty tissue. It has, furthermore, been discovered that extraordinary improvement may be brought about by administering to the children small quantities of the thyroid gland of the sheep. Without such treatment the cretin is an ugly, idiotic dwarf; but if thyroid is carefully and continuously administered, a very rapid improvement takes place in both the bodily and the mental condition. It has even been claimed that complete cure has resulted in some cases. The improvement is naturally most marked in cases in which the treatment is begun in very early life.

A type of idiot who is not infrequently mistaken for the cretin is the Mongol, who belongs to Class I. The Mongol was so named by the late Dr. Langdon Down on account of the obliquity of the eye-openings, which suggest the appearance of a Chinaman or Japanese.

Mongolian imbeciles are often the last children of a large family, of which the other members may be normal. They are quiet, affectionate children, very imitative in their habits, but capable of only a very slight amount of education. In them the thyroid gland appears to be normal, and they further differ from the cretin in that the skin is soft and fine. They have a curious family resemblance to one another, so that they are very easily recognized by anyone who is familiar with their appearance.

General Characteristics.—From what has already been said it is clear that many imbeciles can be recognized at a glance. This is the case with the hydrocephalic, the microcephalic, the cretin, the Mongol. There are many mentally defective children, however, whose appearance does not betray them in this way. Bodily growth and development may be satisfactory, and a bright, alert face may conceal a vacant mind.

Such children are very frequently found, on more careful examination, to exhibit slight physical abnormalities. These have been supposed to indicate that the forces of development are acting retrogressively, and have been termed 'stigmata of degeneration.' It is very difficult to know what significance is to be attached to the occurrence of such stigmata. They are said to be more common in criminals, lunatics, and mental defectives than in normal individuals. In all probability the presence of a number of stigmata, even slightly marked, is more likely to indicate the existence of a strain of degeneracy than the presence of any single stigma in a high degree.

Amongst deviations from the normal which have been described as stigmata may be mentioned asymmetries of the head, face, or body; peculiar forms of special parts of the body, such as a high arched palate, the presence of an epicanthic fold, irregularity of the teeth; developmental deformities, such as hare-lip, cleft-palate, or club-foot; webbed fingers or toes; projecting ears; birth-marks; want of congruity between age and appearance (infantilism).

Even in cases where there is nothing to call for remark in a child's appearance the existence of a mental defect may be evident at an early age. In another chapter I have tried to show how the child's mind develops in association with, and dependence upon, a succession of instinctive and emotional tendencies, which betray their presence by the manner in which the child reacts to the world about it. Thus, we expect a child of three or four months old to be able to gaze at attractive objects and to follow their movements with its eyes; to make efforts to raise its head; and to display, upon occasion, the primitive emotions of fear and anger. By six months the normal baby can grasp objects and carry them to its mouth; it can distinguish between its friends and strangers; it displays surprise, curiosity, and affection. During the succeeding six months the play instinct becomes marked, and the imitative instinct makes its appearance. Then, during the second year, the child acquires, in response to strong innate impulses, the art of locomotion. Imitation becomes more marked, and emulation follows. Curiosity, previously awakened by bright or moving objects or strange sounds, develops into the instinct to investigate everything that can be got hold of. This in turn awakens constructiveness, of which destructiveness is the obverse side. Sociability, love, sympathy, pride, jealousy, humour, obstinacy, all appear in due course. The appearance of these various instincts is observed with pleasure by the mother, who rightly regards them as proof of her child's capacity for normal development. In imbecile infants these native instincts are apt to be fewer in number and later in their time of appearance than in the normal child. The fewer the instincts which are present, the less is the child capable of education, and the lower is the grade of idiocy. If the instincts are absent, there is nothing to which the education can appeal.

A strongly marked characteristic of imbecile children is the shortness of their memory. This feature is commonly remarked upon by their friends. The few things which they do really learn may, no doubt, be held very tenaciously, but almost everything which one endeavours to teach them seems to be forgotten at once. When this want of memory is analysed, it becomes apparent that it is in part due to a want of sustained attention. In the case of many defective children it is almost impossible to catch the attention even for a moment. Other imbeciles are very curious, and have an alert, eager expression, often combined with quick movements, which remind one of those of a bird. These children may have a deceptive air of intelligence, but one quickly discovers that their apparent interest is really due to an extraordinary capacity for being distracted. They no sooner turn their attention in one direction than it is diverted to another.

Another cause of the lack of memory is the defective power of association. Indeed, memory mainly consists in the power of forming associations. Psychologists do not now regard memory as a special mental faculty, and Professor James altogether denies the old copy-book dictum that the memory is improved by exercising it. What we can improve is our ability to recall definite facts or ideas, by associating them in groups with other facts or ideas, and building up pathways of association in the brain.

In the case of the imbecile brain it is particularly difficult to form such associated pathways, and the number that can be formed is very limited. Burnt bairns dread the fire. But if the burnt bairn is an imbecile, he is quite likely to repeat his experience at the next opportunity, because he cannot associate cause and effect.

The Care of Defective Children.—What should be done with mentally defective children? It seems evident that the best that can be done is to keep them for life in institutions set apart for the purpose. Under the care of skilled teachers, and in association with their own class, these unfortunate creatures learn to exercise whatever capacities they possess, and may lead far happier lives than they could do in the outside world. The more intelligent among them may even be quite useful assistants in caring for their more helpless companions. In the great majority of cases life-long care would seem to be not merely the humanest, but, in the long run, the cheapest policy for the State. Inmates of an institution may reach a comparatively high level of attainment in certain directions; they may, for example, become skilful tailors or seamstresses, and yet be quite unfit to live among the general population. Under the stress of competition their weak brains are apt to give way. They are liable to fall in with bad companions. They are unable to resist temptation, and immorality and intemperance quickly undo all that years of patient endeavour have accomplished. No doubt there are border-land cases, where it is very difficult to decide whether a young man or woman of feeble mental endowments can be justifiably kept a prisoner for life, even under the happiest conditions. In such cases the cause of the defect, if ascertainable, and the family history should count for much in coming to a decision.

An Educational Classification.—When a child is discovered to be mentally defective or imbecile, its relatives naturally wish to know what chance there is of improving it by careful education. Now, the diagnosis of the nature of the pathological condition which is present, in accordance with Dr. Ireland's classification, does not help us very much. We know, indeed, that imbeciles belonging to certain groups will remain hopeless imbeciles all their lives, unable, in all probability, to do anything for themselves. We know, also, that the members of other groups are capable of a certain, but very variable, amount of education. But what is wanted is not a simple general statement, that children of a certain class are or are not likely to improve, but a definite prognosis of a particular case. In forming an opinion as to the prospects of an individual child, one finds most help in discovering the number and strength of the native instincts to which education appeals. In accordance with this statement, my friend Dr. Clarkson, the visiting physician to the Institution for Imbecile Children at Larbert, has proposed the following classification, arranged upon an educational basis. He divides the feeble-minded into four classes:

1. Where the primitive instincts (p. 339) are almost all wanting, and where there is little or no power of association.

2. Where one or more of the primitive instincts, including constructiveness, is absent, or very feeble, but where some instincts are present and fairly strong, and where there is some power of association.

3. Where all the native reactions are present, though feebler than normal, but where the power of association is so deficient that the child will always remain a simpleton. The feebleness of the primitive instincts is shown by the difficulty of apprehending abstract qualities, and in cases of difficulty is to be determined by the arithmetical test—viz., inability, in spite of special trouble having been taken

with education, to pass the fourth standard in arithmetic at the age of fourteen.

4. Where there is any deficiency in the primitive instincts or the power of association, and where epilepsy is present and cannot be cured.

The fourth class Dr. Clarkson admits to be utterly illogical, but he defends it as practically most convenient.

Obviously the outlook in cases belonging to the first class is very hopeless. All that can be done for such children is to feed and clothe them, and keep them warm, clean, and comfortable. They are often delicate, and many of them die young.

Children of the second class are capable of some improvement, but are not capable of learning ordinary school subjects, such as reading and writing. They should, so far as possible, be taught to play with toys, to dress and undress themselves, and to behave at table.

Children of the third class can be taught a good deal. Their education should be begun early, and persevering efforts should be made to teach them all the little things which normal children are spontaneously eager to learn. They should be taught to dress and undress, to feed themselves, to keep themselves clean and tidy. The formation of bad habits should be checked. From kindergarten occupations they should proceed to simple housework, and then to knitting, sewing, gardening, and so on.

In the epileptic class the outlook is much worse than a superficial examination would lead one to expect. These children are often bright and fairly intelligent between their fits, but after a fit, or a series of fits, they are for a time dull and drowsy; and when they come to themselves they have forgotten a great deal of what they have learned, and the work has to be done over again. In the long run they tend to become helpless dements.

The care of these poor creatures may well seem a discouraging and disheartening task. Discouraging and disheartening of necessity it often is. But we must remember that to give even an imbecile a contented and happy life instead of a miserable one is no small matter, and so much, at least, is usually within our power. By no means infrequently imbecile children win the affection and awaken the interest and enthusiasm of their nurses and teachers. Some time ago I was congratulating the superintendent of an institution for imbeciles on the excellent results which his patience and care had been able to achieve. 'If you can find anyone who gets better results,' said he, 'I hope you will let me know. I shall very soon find out how he does it, and copy him.' This man, surely, is of those who have found their work in life.

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